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YOGA-MĪMĀṀSĀ

A Quarterly Journal devoted to Scientific and
Philosophico-Literary Research in Yoga

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पुस्तकालय
गु० कां० विश्वविद्यालय
हरिद्वार

Vol. 28
No. 3-4
Vol 28
No. 1-3

OCTOBER 1988, JANUARY 1989

Vol. XXVII. No. 3 & 4

KAIVALYADHAMA
LONAVLA-410 403 (Maharashtra) INDIA

YOGA—MĪMĀMSĀ

A Quarterly Organ of Kaivalyadhama
Founded in 1924 by Swami Kuvalayananda

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Yoga - Mīmāṁsā

October 1988—January 1989.

VOL XXVII No. 3 & 4

KAIVALYADHAMA
LONAVLA–410 403
(Maharashtra–India)

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Printed at Yoga—Mimāṁsā Mudranalaya, Lonavla and
Published by Dr. M. V. Bhole for the Kaivalyadhama,
117, Valvan, Lonavla 410 403.

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Yoga-Mīmāmsa

Vol. XXVII Oct. 88 & January 89 No. 3 & 4

EDITORIAL NOTES

May the maker of all make this journal a success. Blessed is the name of the Lord. May He bless the workers of the Ashrama with a happy and prosperous career as servants of the world which is only the Lord Himself objectified. May He, that has created us in His infinite wisdom, lead us to the light that is beyond all darkness.

+ \+ \+

Dr. M. V. Rajapurkar has joined the Institution as Asstt. Director of Scientific Research from Nov., 1987 after retiring from the post of Director of Medical Education, Maharashtra State and some other assignements thereafter. He has prepared his first special article, 'Lateralization of Cerebral Functions' for this journal. The readers will find answers to the 'why ?' of some of the yoga practices like Anuloma–viloma, Suryabhedan and Chandra–bhedan pranayamas which may be helping the practitioners to enhance the functions of particular cerebral hemispheres.

+ \+ \+

Shri Mahesh Dave and Dr. M. V. Bhole have reported their observations on the effects of Pranava Japa (Om recitation) in respect of the nature of sensations, feelings and experiences, breathing movements and pronunciation of Om in a group of participants attending Kriya Yoga sessions over a period of seven years and have concluded that the experiences could be of positive and negative nature.

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Shri S. K. Ganguly and Dr. M. L. Gharote have reported the beneficial effect of yogic training programme on cardio-vascular endurance and flexibility in a group of police cadets in their article, 'Effect of Yogic Training on Endurance and Flexibility level'.

+ + +

Drs. B. L. Meti and T. M. Srinivasan have reported their findings on the improvement in respiratory functions in proven cases of obstructive type of bronchial asthma in the article 'Bronchial Asthma' – Mangement through practice of Yogasana and Pranayama.

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In the article, 'Understanding of Kapalabhati and other related terms according to yogic sanskrit texts with some comments', Drs. B. P. Desai and M. V. Bhole have tried to throw light on the meaning and understanding of the terms Kapalashodhana, Kapalabhati, Kapalabhranti, Kapalavirechana and have tried to present Kapalabhati as a technique and an effect quoting various sanskrit sources.

+ + +

Dr. P. Jha has compared the eight-fold noble path preached by Lord Buddha with the Asthanga yoga of Patanjali in his article, 'Astamagga and Astangayoga – a comparative study.

+ + +

Shri G. S. Sahay has pointed out the need to reexamine Patanjala Yoga Sutra III : 37 in his article, 'te samadhavapasargah – a re-visit' in the light of the emphasis given on powers in chapter three.

+ + +

In the article, 'Yoga and Massage', Dr. M. L. Gharote has brought out the salient features of general massage and has explained how the massage of internal organs can take place during the performance of asanas, pranayamas, bandhas, mudras and kriyas along with the differences in both the approaches

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The article, 'Yogic Shatkriyas and Ayurvedic Panchkarmas – Some thoughts and reflections' by Dr. M. V. Bhole brings out the points of similarities and differences between the two and it could be thoughtprovoking for the readers.

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One of the completed piece of literary research work, 'Glossary of the Samkhyakarikas' by Swami Digambarji, Dr. Mahajot Sahai and Dr. M. L. Gharote has been published in this issue. Samkhyakarika is the most authoritative text explaining the Samkhya philosophy. There have been many commentaries on it. However, for the better understanding of the technical terms of the *S*amkhyakarika, the Glossary of the technical terms prepared by the authors will prove very useful for the deeper understanding of this text. It will also help in understanding other texts related to Samkhya philosophy. We are sure the readers will appreciate the hard work of the authors.

+ + +

May the Lord give us strength to carry on this work. May He ever widen the circle of our sympathisers and thus allow us to serve His Childreu to the best of our ability.

Date : 17 Jan. 1989.

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Date : 17 Jan. 1989.

Yoga Mimamsa Vol. XXVII, No. 3 & 4 pp, 1 to 18, October 1988. January 1989.

Lateralization of Cerebral Functions

(Right-Left Brain Studies-A Review)

*Dr. M. V. Rajapurkar**
M.B., M.Sc., D. Phil.

I-Introduction :

The earliest mention of nostril dominance or lateralization of nasal breathing and its importance in the proper functioning of the human body is found in 'Shiva-Swarodaya' an ancient yogic text.

According to 'Shiva-Swarodaya' 'Prana' or current of life manifests through nostril breathing. According to 'Swara Yoga', at any given time, dominance of breathing through one nostril is a normal phenomenon in healthy adults. When breath flows through the right nostril it is termed in ancient texts as 'Pingala' or 'Surya'. When it flows equally through both nostrils it is referred to as 'Susumna' or 'Saraswati'.

This nostril dominance changes at regular intervals and can be controlled by positions of the body, external aids ('Yoga danda') and by practice voluntarily. The rhythmic flow of breathing in alternate nostrils fits with the recent concept of 'Infradian-rhythm'.

Ancient Yogis attached considerable importance to breathing patterns. They recommended that the breathing pattern (right dominance or left dominance) be specially

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*Assistant Director of Research, Scientific Research Department Kaivalyadhama SMYM Samiti, Lonavla-410 403 (Pune Dist.).

studied, so as to gear the body and the mind to get the best results mentally, emotionally and physiologically in the performance of a given task. 'Shiva-Swarodaya' describes in detail the five elements of which the earth and body is made, it refers to five 'Pranas', the concept of 'Nadis', and the relationships of the laterality of breathing to these, to bodily functions, and other wordly functions.

It is stated that breathing through the right nostril, is related more to active, alert and aggressive behaviour, whereas breathing through the left nostril is related to quieter psychological states, more oriented to inner experiences.

Considerable importance is also attached to nostril breathing-inhalation through right (Surya bhedan) or left nostril (Chandra bhedan) or both (Ujjayi) in the practice of Pranayama in order to attain higher spiritual goals (Hathapradipika, 1970).

What causes the breath to flow sometimes through the left, and sometimes through the right nostrils, and sometimes equally through both is not clear. Possibly it is dependent on controls by the higher systems of brain. Do inputs from the olfactory system affect many aspects of brain functions or vice versa ?

The lower vertebrates have twin hemispheres in their brain, each capable of doing what the other does. This is not true of man, since hemispheres in many ways have specialized function which are eradicated by damage.

Only recently crucial differences between the right and left brain have come to light. When the corpus callosum is cut the autonomy of the two brains, in the human being becomes apparent.

It should be noted that on section of the corpus callosum, ordinary behaviour is hardly affected but the impact on behaviour in certain situations is tremendous. Each hemisphere produces such strong emotions that the two minds struggle for supremacy, as if they are distinct different selves.

There have also been reports about the relationship of nostril breathing and occurrence of certain pathological states like headache, chronic rhinitis, dyspepsia, tempermental changes etc. These have been reviewed by I. N. Riga as far back as 1957.

"This is all reminiscent of what has been written recently on right brain/left brain, and it seems logical to ask whether nostril flow pre–dominance is correlated with the pre–dominance of one hemisphere over another" (R. Ballentine).

In view of these findings, and the importance attached to the science of breath in yogic texts, and considerable research work done on right and left cerebral hemisphere dominance in recent years, it was felt that a brief review of the recent literature related to the problem of 'lateralization' and right–left brain concept would be in order.

The review is in three parts :

a) Review of work at Kaivalyadhama, Lonavla.
b) Lateralization in infancy.
c) Lateralization in adults.
d) Philosophical interpretations of the findings.

II. Review of the work done at Kaivalyadhama :

In our laboratory at Kaivalyadhama, Lonavla much research work has been done. It has been shown by Vinekar

(1966) using the electro-nasography technique that air discharges from the nostrils give different electrical potentials.

Bhole and Karambelkar (1968) showed that normally the two nostrils have unequal air fllow in most of the subjects and the force of breathing through either of the nostril can be influenced by the Yoga Danda. It is seen that the nostril opposite to the side on which the yoga danda is applied opens or the nostril on the same side starts working less than before.

Vijayendra Pratap and Wade Berrettine (1975) have studied the right and left hemisphere difference in Mantra Meditation.

Moorthy, Ganguly and Bhole (1982) have shown that there is a positive correlation between more grip strength and right nostril dominance.

In a survey of lateral dominance and performance of Yogic postures like Padmasana and Gomukhasana, Gharote (1988) found lateral dominance to be independent of use of upper leg in Padmasana by males and females. However, the position of upper hand in Padmasana and upper leg in Gomukhasana were found depending on lateral dominance.

III. Lateralization in Infancy :

Few neuro-physiological topics have stimulated as much interest as the study of lateralization in hemispheric functioning.

An important aspect of developmental neuro-psychology is the-'differential lateralization' of the behavioural functions between hemispheres.

When does the lateralization start in human development ? When is the development most rapid and when does it stop ?

Developmental interest in lateralization was also promoted by the educational problems about difficulties attributable to left handedness and some attempts to correct the students' 'handedness' problem. Two views dominate at present on the ontogency of lateralized functioning. According to Lenneberg (1967) the cerebral hemispheres of infants from birth till two years, are equally capable of learning language. However, from two years till puberty, the left hemisphere takes increasing control of speech and remains inflexible throughout life with the left hemisphere. The second view held by Kinsbourne, 1976, suggests that lateralized functioning' does not develop, it is there from the start', meaning thereby that the left hemisphere is programmed from the start for language and motor function in the majority of the population. There is more evidence to support this latter view.

Geschwind and Levitsky (1968) showed that left temporal lobe was larger than the right in 65% of adult brains. This reawakened interest in the anatomical correlates of lateralization.

Studies by Chi et. al., (1977) in several hundred foetal brains showed that the transverse temporal gyrus (essential for language and comprehension), the calcarine fissure of the occipital lobe, superior frontal gyrus, superior temporal fissure, developed earlier in the right than in the left hemisphere in the majority of cases. However, Wada et al al. (1975) have shown from studies in the foetal neonatal and infant brains that 90% of them have a larger left temporal lobe. This has been confirmed by several observers. The studies are essentially in gross anatomy and cannot be directly related to functional lateralization. The correlation between anatomical and functional lateralization is still to be achieved.

Morgan (1977) proposed that lateralization depends solely on genetic factors of the mother. Ānnett (1970) suggested the action of a single, 'right–shift' gene responsible for lateralization, where as J. Levy and Nagylaki (1972) proposed a two gene model, each with two alleles, allowing for lateralization of speech and handedness.

Perceptual Asymmetry :

The finding of asymmetries in the perception of speech like auditory stimuli in infants is similar to those demonstrated in adults. Entus's (1977) studies in 48 infants showed right ear advantage for verbal stimuli and left ear advantage for non–verbal stimuli. Consistent right ear advantage for verbal stimuli from childhood to adult age has been reported by many workers.

Motor Asymmetry :

Several studies have been conducted in laterality in motor performance and manual perference in infants. Most common parameters studies are 'head position' and development of 'handedness'. It is seen that most infants show a consistent rightward perference in head positioning. It has also been seen that neonates under 12 hours of age are likely to turn right as often as left. However, after 12 hours of age most full term new borns maintain a strongly prevelant lateral head position, rightward for most and leftward for some. The explanation is obscure.

Similarly it is seen that the infant responses to right sided stimulation with rightward head turn more often than to leftside stimulation and left head turn.

The underlying mechanism is not clear. Some hold that the head position in utero during development contributes to lateralized behaviour after birth (Michel and Goodwin, 1979). Other workers attribute lateralized response to programmed asymmetriacal cortical control of motor behaviour (Kinsbovrne, 1980). This interpretation is strengthened by the observation of asymmetry of the stepping reflex in new born.

Babies with left sided head position used the left hand more often, where as babies with right head position, reached more often with the right hand. This may also explain the manual preference in adult life (Michel's 1981) Whether handedness is inherited is still controversial.

Electrophysiological Studies :

Auditory evoked responses (ĀER) to four speech stimuli, noise and a 'C–major' piano chord was studied in infants, children and adults by Molfese (1977). Most subjects of all ages showed greater amplitude in left hemisphere AER to speech sounds and greater right hemisphere amplitude for music and noise, thus suggesting a consistent electrophysiological asymmetry from infancy to adult hood. It may be noted that there is not complete agreement on several observations. Having briefly reviewed some of the observations regarding lateralization in infants, we may turn to see what happens in adults.

IV. Lateralization in Adults :

Inside the human skull is the brain whose prominent and large parts are–Right and left cerebral hemispheres. Normally the two are interconnected by a structure called the corpus callosum. The interconnection helps them to work together sharing the functions of the brain.

Recent research has shown that the two brains are not alike, and several functions and behavioural responsibities are divided between them. This division of specific functions is unique to human brain.

For centuries research was focussed on the left brain, possibly because the speech centre (Broca's area) is located in the left brain. It has even been labelled as the major hemisphere. The right brain was given a back seat, and was called the minor hemisphere. Recent work has shown that this concept is wrong. When the corpus callosum is cut the autonomy of the brains is clearly seen. Each on its own can think, learn and remember. Each is capable of strong emotions. In certain situations the impact on behaviour is very striking.

In other vertebrates than man, each is capable of doing whatever the other lobe does. This is not the case n man.

Best example of cerebral speciality is **'Handedness'**. Almost 92% of the people use their right hand for most delicate physical tasks and thus involve their left brain in the execution of the task. It is however, not clear why the right hand should be so favoured.

The ability of speak and write is located in the left hemisphere in 97% of the world's population.

Left handed people use the right brain to control physical movement, but involve the left brain for speech and to determine what they write.

Apart from experiments in animals, the information about the right and left brain functions have come from people, whose brains are damaged by accident or injury or affected by turmours leading to surgical ablation of parts of the brain or the corpus callosum is absent due to a developmental defect.

For several years in cases of intractable severe epilepsy the surgeon used to cut through the corpus callosum separating the right and left brain. Studies on such human subjects and as a result of well planned animal experimentation considerable information has evolved giving the right hemisphere a very important place in the working of the central nervous system.

Way back in 1745 a physician recorded a case of a patient whose left brain speech centre was damaged. The patient could not speak and communicated by making signs with his hands. Peculiarly, the same patient could sing certain hymns, learnt before illness, like a normal person. It was then an unexplained phenomenon. However, we now know that singing and other musical abilities are right brain function.

An English physician Hughling Jackson (1864) examined a patient with turmour in her right hemisphere. The patient did not know objects, places and persons. The capacity of visual perception was lost.

These and similar observations ultimately resulted in the organization of research at the University of Chicago and later at the California Institute of Technology. The Chief researcher was Roger W. Sperry. These studies clearly showed that right brain significantly influences certain aspects of behaviour, and also that each person does have two minds !

Visual Learning :

Ronald Myers, working with Sperry planned to find out the visual learning in cats. In the cat, as in man, the right side of the retina takes up images from the left visual field and vise versa. Further there is decussation (cross-over) in the optichiasma before the fibres reach the occipital lobes. This results in right brain receiving impressions of the left visual field and the right visual field being represented in the left brain. Myers through skilled surgical procedures, which included section of the corpus callosum, had cats, such that each hemisphere had its own eye-right brain right eye and left brain left eye. Thus an experimental model was prepared where one could study how the splitting of the cats' vision and of its brain affected behaviour.

Myers taught the split-brain cat to discriminate with left eye only, the difference, the right being covered between a circle and a square. When, however, left eye was covered and cat saw with the right eye, the cat showed no signs of recognition. It had to be retrained to discriminate with the right eye. Normally an animal which has learned the problem with the one eye, can solve the problem with the other eye also. This shows that Mayer's cat had two brains, each capable of learning, but functioning independent of each other.

The observations that a 'split-brain cat' could use either of its two brains independently led Roger Sperry and Michael Gazzaniga to study behaviour in split brain human. Splitting of the corpus callosum, in severe cases of epilepsy, in human was then being undertaken by surgeons. Thus human subjects were available for experiements. In these subjects there was no noticeable change in temperament, personality or general intelligence, when the corpus callosum was surgically served.

Sense of touch :

Experiments were designed by Sperry and Gazzaniga to study the handling of the sense of touch by these patients. simple objects such as spoon or comb etc were kept hidden behind a screen so that the patient could not see them. The subject had to identify the objects by feel. For sensation of touch also the right hand is represented in left brain and vise versa. In these cases there was, as stated, no interconnection between the two brains. These experiments showed that if the patient felt the object with his right hand, his left brain would know but the right right brain would be unaware of it.

Visual tests presented a difficult problem since it was not possible to tinker with the optic nerve as was done in the cat. To meet this challange two methods were used.

a) The patient looked straight ahead without moving his eyes. Very brief image was flashed to one side of the retina and would register only on one side of the brain.

b) A more sophisticated method was used, where one eye was fitted with a contact lens, on which is mounted a small optical system, which transmits vision only to one field and the visual input is limited to one hemisphere, the other eye being covered. This is known, as the stabilizer occulder technique and is the work of Eran Zaidel.

Impulses from light flashed on the right half of the retina were seen by the left brain and were easily reported by the subject. However, when light was flashed on the left half of the retina, the impulses went to the right brain–the right brain saw the light, but lacking speech could not verbalize. When, however, the patient was asked to point to the source of light with a finger, the patient had no difficulty suggesting that right brain can control physical movement.

Reading :

When **printed instructions** (reading) were used to carry out motor actions similar results were obtained. Instructions flashed on the left visual field, failed to elicit a response, because the message was projected to the right hemisphere, which could not give motor instructions.

Similarly the subject could not name or describe common objects placed in the left hand, if they were hidden from view, since the sensation of touch had gone to his mute right brain. The responses to description of left hand activities have been described as 'bizarre'. Several experiments have proved that neither hand–neither brain–knew what the other was doing.

Tests with 16 subjects who had split brain, gave evidence of different powers of the two brains. When asked to copy simple designs with the left hand (controlled by right brain) he did a fair job, because the right brain excels in space perception.

However, when asked to copy with right hand, the patients could hardly do it, thus showing that the left brain is spatially inept. 15 of the 16 subjects were right handed.

Thus at certain tasks the right brain proved to be superior to the left. It controlled the left hand in **spatial skills**, such as arranging blocks to match a picture design or drawing a cube in three dimensions, but could not copy a written word. The right hand could not cope with special tasks.

Most extraodinary, each half of the brain proved to have will, and emotions of its own.

It is not possible in an article to review the wealth of information that has accumulated on the subject. However, new portrait of man's two minds emerges. The **left brain** controls speech, is logical and talented in such subjects as mathematics and science i. e. subjects which requires **sequential processing** of information. It is highly literate, reasons and is analytical.

On the other hand **right brain** is intuitive, non–verbal and more aware of the body's orientation in space. The right brain also recognizes different musical sounds. The right brain shows unexpected potential for language. The right brain has special powers of spatial **perception, intuition** and is particularly important for **creativity, music, art** and **atheletics.**

The appreciation of the functions of the right brain has been one of the most significant contributions to research in the understanding of nervous system functions.

Philosophical interpretations :

The philosophical implications of split brain research are of great significance. It is well known that some people are verbal and analytic, while other are non–verbal and intuitive. These two behavioural patterns of human being fully supports the concept of two brains, the analytic left hemisphere and the intuitive right hemisphere.

Man's highest achievement seems to flow from integrated activity of left brain intellect and right brain intuition. Many discoveries in every field involve an inspiration, a right brain activity. Without left brain's attention to detail, the right brain hunch may remain a fantasy.

Albert Einstein one of the most brilliant thinkers of modern times stated, "The really valuable thing is intuition, A thought comes and I may try to explain it in words afterwards" There cannot be better tribute to the importance of the right brain. Without right brain there would be no ideas nnd without left brain, the ideas cannot be explained.

Research in the split brain personality has challenged our understanding of consciousness. It attacks our very concept of unity of personality. The concept of unity was rarely questioned. In support I quote Sir Charles Sherrington "The self is a unity–it regards itself as one, others treat it as one, it is addressed as one, by a name to which it answers. The Law and the State schedule it as one. It and they identify it with a body which is considered by it and them to belong to it integrally. In short, unchallenged and unargued conviction assumes it to be one. The logic of grammar endorses this by a pronoun in the singular. All its diversity is merged in oneness".

Studies with hemispheric disconnections have questioned this unity concept. Marcel Proust feels that experience of mental unity is an illusion. He states "We feel in one world; we think, we give names to things in another; between the two we can establish correspondence but we do not bridge the interval".

Roger Sperry also contributes to the duality of consciousness, when he says "These people do not complain spontaneously about a perceptual division. There is no indication that the dominant mental system of the left hemisphere is concerned about, or even aware of. the presence of the minor system under most ordinary conditions, except quite indirectly for example, when an occasional response is triggered from the minor side. As one patient remarked immediately after seeing herself make a left hand response of this kind : 'Now I know it was not me that did that".

I would like to quote Dr. David Galin of the Langley Porter Neuropsychiatric Institute in San Francisco. He thinks, "the right hemisphere's performance is strikingly similar to the operation of 'unconscious' processes. For one thing, both the right hemisphere and the unconscious deal with images which cannot ordinarily be verbalized. Second, their functioning depends less on logical analysis than on the perception of total pictures, which psychologists refer to as Gestalt."

"It is important to emphasize that what most characterizes the hemispheres is not that they are specialized to work with different types of materials" (the left with words, the right with spatial forms) says Dr. David Galin; "rather, each hemisphere is specialized for a different cognitive style–the left for an analytical, logical mode in which words words are an excellent tool, and the right for a holistic, Gestalt mode, which happens to be particularly suitable for spatial relations"

Three fourths of the cortical terrain is still uncharted. somewhere in these labyrynths reside the most important and enigmatic of man's attributes–viz., thought, creativity and love.

The various problems and doubts are not finally settled. What advantage or superfluity is involved in the constant united activity of both hemispheres is still an open question.

In summary I would stress that it is a brief review. All the reported work has not ben reviewed. The subject has been chosen because of its great importance in Neuro-physiological research. It has been classed as one of the most significant contributions, spear–headed by Roger Sperry and his colleagues, which seems to shake some of our accepted foundations of consciousness and personality.

It is surprising that ancient Indian sages have already recorded definitive observations on lateralizations of nasal breathing and its applications to human physiology and psychology.

It is possible that this knowledge of the functions of the right hemisphere may give us insight into how yogic knowledge was acquired. It is possible that Yogic practices may help develop and enhance right brain functions and thus lead to a better understanding and expression of intuitive knowledge and reality.

It is hoped that the review has enough material to stimulate interest and further research in this field.

Acknowledgements :

I am thankful to Shri O. P. Tiwari, Joint Director of Administration and Secretary for loaning me a copy of 'Shivaswarodaya', and for considerable encouragement. I am also thankful to Dr. M. V. Bhole, Joint Director of Research for having critically gone through the article.

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Yoga Mimamsa Vol. XXVII, No. 3 & 4 pp, 19 to 28,
October 1988. January 1989.

Effects of Pranava Japa (Om Recitation) Part One--An Experimental Study

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Introduction :

Since 1968, once a year, during the months of Dec.-Jan., workshops or Camps of two weeks duration of Patanjali's Kriya Yoga (i. e. **'Tapas-Swadhyaya-Ishwar Pranidhana'**) were held at the Kaivalyadhama Ashrama under the guidance and supervision of Swami Digambarji. These work-shops were called as **'Pranava Anusthana'**.

Till 1987, each of the authors had participated in ten workshops. During their first workshop, they observed that the participants used to discuss about the nature of the sensations, feelings and experiences related to various practices amongst themselves in the free time. When most of the participants were enjoying the practical sessions, some complained about unwanted sensations, reactions and after-effects of different techniques. Recitation of 'Om' was one of them.

Therefore both the authors decided to enquire from the participants about the feelings, experiences, nature of the sensations, and responses to various techniques in the subsequent sessions with a view to understand them in

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respect of a large population. The observations on the effects of 'Om' recitation (Pranava Japa) as communicated by the participants of these workshops revealed interesting and valuable information. Therefore it was decided to present them here for the consideration of Yoga teachers, students and philosophers.

Materials and Methods :

Since 1968, during the months of Dec.–Jan., 20 to 30 persons of either sex in the age group of 25 to 60 years were admitted for the workshops on Patanjala Kriya Yoga which were of residential nature. About 15 to 20 persons used to be from the earlier work–shops, while others used to be new participants. The present study was carried out on workshops held from 1980 to 1987 with the exception of the workshop held during 1984.

The camp used to start from the 11th day of the moon and conclude on the 12th day of the moon after two weeks. Actual sessions used to start from the evening of the 12th day of the moon and continue upto the noon of the tenth day of the moon. Everyday, there used to be three sessions as follows :

1) Morning session from 7.00 to 8.30...Recitations, talks and practices.

2) Noon session from 11.00 to 12.15...Recitations and Practices.

3) Evening session from 5.30 to 7.00...Recitations talks and practices.

Before starting the practical sessions, Swamiji used to guide the participants in reciting the first two 'Padas' (Chapters) of Patanjala Yoga Sutra in a traditional way.

In the morning and evening sessions, he used to give talks on the philosophical, theoretical and practical aspects of these sutras and yoga practices. Actual practice session used to last for 40 to 45 minutes.

The programme of practice sessions used to be as under :

1) **Tapas**–Practice of Pranayama viz. Anuloma-Viloma, Ujjayi and/or Bhastrika–According to one's capacity, 10 rounds each in a comfortable sitting position. This used to take about 15 to 20 minutes.

2) **Swadhyaya**–Pranava Japa i. e. recitation of 'Om' Pronunciation of 'A–U' for three matras (i. e. about 3 secs.) terminating in nasalised 'm' to be prolonged to the capacity of the individual and ending in a void-like experience before inhaling for the next Omkar. Usually this used to take about 10 minutes in first week and about 15 minutes in the second week.

3) **Ishwar—Pranidhana**–'Havan'and 'Pujan' through 'Gayatri' (Savitru) and 'Tryambaka' (Mrutunjaya) mantras. This was adjusted between 10 to 15 minutes according to the time spent for the first two categories of practices.

In the first week, time devoted for the instructions by Swamiji was relatively more, while in the second week more time was spent for the practices.

All the participants were advised to have one meal a day at noon and only fruits and milk in the evening. They were urged to refrain from long walks, activities involving exertion, keeping late at night, watching T. V. for long time, reading and discussions on un-related topics. They were also advised to take enough rest and sleep and to reflect and contemplate on the talk given by Swamiji and the experiences they had during the practical sessions in the leisure time.

Information on the following points was collected from the participants through individual contacts at the interval of two to three days :

I) **During the First and the Second Week :**

Nature of sensations, feelings and experiences related with the recitation of Om.

II) **During the Second Week :**

A. Nature of breathing movements related with the recitation of Om with reference to :

1) the areas exhibiting movements when the recitation of each Om was started.

2) Changes, if any, in these areas as the recitation of each Om progressed and came to an end.

B. The nature of pronunciation of Om.

An attempt to get these informations in the hand-writing of the participants was not successful. Therefore method of verbal communication was adopted.

As the participants were in the mood to practise and get the experiences in a holistic way and as the authors were basically interested to find out the varied nature of the sensations, feelings and experiences of different individuals, research methodology in the strict scientific sense could not be followed during this study neither the control group was possible.

Observations :

All the participants did not communicate freely. During the course of six work-shops, it became possible to get information from 110 participants out of 165.

Even though one particular technique of reciting Om was introduced in the class for learning and practice, people developed feelings and experience of varied nature.

In the beginners and during the first few days even for the repeaters, the variations in experience were more. They have been broadly classificd into two heads as follows :

I) **Nature of Sensations, feelings and experience :**

A) **Positive Feelings and Responses** : i. e. people aspired to have them again and wanted that they should not come out of that state, nor they should be disturbed by others.

1) Experiencing vibrations of gross to subtle nature in different parts of the body was reported by almost all the respondents by the end of ten days.

2) The subtle vibrations were felt in the core of the body right upto the tips of the fingers and the toes and this was reported by at least 65% of the respondents.

3) It was felt as if the vibrations were travelling from below upwards towards the top

of the head where they were intensely felt for a longer time. This was reported by about 50% of the subjects.

4) The subjects felt that the vibrations travelled along some kind of a path and it went out of the body through the top of the head. At times, even the individual felt being carried along with these vibrations out side the body. This was reported by about 10% of people.

5) Experiencing a kind stand–stillness in respect of the body awareness where breathing, thoughts, perceptions and emotions did not work as disturbing factors. This was experienced by almost all the respondents sometime or the other during the second week.

6) Visualisation of light along with vibrations was reported by about 60% people.

7) Feeling, as if, one can get out of the body and look at the body from outside was reported by about 4% people.

8) Feeling relaxed, open and free was reported by more than 70% people.

9) Feeling like sitting all alone in a calm and quiet place without being disturbed by anything, not even breeze, strong light, sound, clothes etc. was reported by at least 20% people.

B) **Negative Responses** : i. e. people did not like to have them :

1) Developing tension in the head leading to headache after the recitations was reported by 20 persons (i. e. 18 %)

2) At least 15 persons (i. e. 13%) complained of 'insomnia'

3) Constipation was reported by 20 persons (i. e. 80%).

4) Increased sexual tensions were communicated by 10 persons (i. e. 9%).

5) A kind of vague undescribable uneasiness in different parts of the body, but mostly restricted to the region of the back bone and the abdomen was reported by about 40 persons (i. e. 35%).

6) Experiencing some kind of blocks or knots present at different places inside the body was reported by at least 15 people (i. e. 13%).

II) **Nature of Breathing Movements during recitation** :

1) At least 18% of the participants were strongly believing that they were holding the breath while reciting Om.

2) Another 15% were doubtful about the nature of the breathing activity during recitation of Om.

3) More than 60% of the new participants were unable to give a definite answer to the question, how they were experiencing their breathing ? About 15% of the repeaters responded in the similar manner.

4 a) Area below the umbilicus moved while reciting Om in 8% of the subjects.

b) Area above the umbilicus moved while the umbilicus did not move at all in 40%.

c) Only the chest region exhibited activity in 30%

d) Chest and abdominal area exhibited movements in 22% of the respondents.

5) It was also observed that in many subjects the breathing movements started in the abdominal area and progressed to the thoracic area, while in 16 individuals the activity started in the chest region and progressed to the abdominal area during the recitation of Om.

6) Likewise, even though, usually the abdominal wall exhibited contraction, in 8 cases it exhibited bulging-out during Om recitation.

III. Pronunciation of Om

Even though Swamiji had given instructions to recite Om in base tone and to prolong nasalised 'm' for a long time; during the first week, wide variations in the pronunciation of Om was also observed. Due to constant coaxing by Swamiji, during the second week, the pronunciation of Om improved in most of the participants.

Discussion :

1) Even though various experiences reported by the participants were ascribed to 'Om' recitation, the possibility of the influence of 'Pranayama', 'Havana' and 'Pujana' cannot be completely overruled. However, most of

the participants were confident of their experiences being related to 'Om' recitations, because they did not get those experiences when they omitted Om recitation from their practices.

2) In the beginning, almost every one recites 'Om' in one's own way in spite of competent guidance being available to them.

3) The recitation of 'Om' produces resonating sound consisting of vibrations. The sound is heard through the ears. But the resonance and the vibrations can be felt throughout the body. This leads to the internally aroused sensations and feelings and helps the awarness to get internalised. More recitations of 'Om' can increase the intensity of internalised awareness through cumulative effect and this leaves its impressions on the mind of the individual.

4) In addition to the development of the internalised awareness, 'Om' recitation can also act as a 'sounding technique' which examines and analyses one's body image and awareness without one's intentions to do so. Due to this action of 'Omkar' some of the suppressed and forgotton sensations, can be brought back to one's awareness as distractions or disturbances even though, on other side, one may be experiencing positive responses already mentioned above.

5) The disturbance in the internalised awareness could be so intense, so as to force the practitioner to stop Om recitations and take recourse to some other suitable techniques to pacify the errupted troubles. After the troubles subside, recitation of 'Om' could be resumed once again.

6) While working with Pranava Japa in this manner, the vibrations and resonances set up by Omkar can get organised in such a way so as to give rise to an awareness of complete stand-stillness of body, breathing, thoughts and emotions. However, such an experiential state may not last for long and once again the awareness of various disturbances will develop against the wish and will of the individual. However, the impressions of earlier Om recitation can gode or compel the individual to practise further in order to re-inforce responses of positive nature.

7) Many of the negative responses like headaches, sexual tensions, feeling of uneasiness, insomnia can be ascribed to the over-stimulation of the nervous system due to Om recitation and/or the way in which Om was recited by the individual.

Conclusions :

Within the limitations of the present study, it could be concluded that recitation of Om usually gives rise to sensations, feelings and experiences of positive nature, meaning thereby that the individual aspires for more of them and wants the resulting mental state to continue.

These experiences can lead to the development of a kind of existential awareness wherein any particular definable awareness of body, breathing, thoughts, emotions and the world around is absent.

However, sometimes and in some individuals unwanted sensations, feelings and experiences can also develop through the recitation of Om and these can compel the individual to stop the practice and take recourse to somethings else to alleviate the suffering before one can once again think of starting "Om" recitations.

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Yoga Mimamsa Vol. XXVII, No. 3 & 4 pp, 29 to 39,
October 1988. January 1989.

Effect of Yogic Training on Endurance and Flexibility level*

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Abstract :

The purpose of this study was to see the effect of Yogic training on Endurance and Flexibility. The study was conducted on 70 students of the Regional Police Training School, Khandala from which 35 students were assigned to each of the Experimental and Control groups. Significant lowering of the sitting pulse rate was observed in the Experimental group as compared to the Control group. The Cardio-vascular endurance as judged by the Harvard Step Test improved significantly in the Experimental group. Although mean increase in the Toe Touch Flexibility was observed in the Experimental group, it did not reach the expected statistical significance.

Introduction :

Health and Physical fitness are supposed to depend upon the Cardio-vascular endurance and the flexibility of an individual. Cardio-vascular efficiency is the capacity of

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* This study was carried out with the Grant-in-aid from the Ministries of Education, Govt. of India and Maharashtra State.

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an individual to maintain strenuons activity of the whole body for a long period (2) and flexibility is defined as the range of movement of a joint (14). The finding of Hein and Ryan (11) pertaining to the effect of strenouus activity on Cardio-vascular disorder stated that a high level of physical activity throughout life appears to be one of those factors that inhibit the vasular degeneration characteristic of coronary heart disease. Taylor (17) mentioned that sedentary people were having more risk towards coronary heart disease than those who involved in moderate to heavy physical activities. Wolffe (19) recognised the beneficial effect of physical activity on the Cardio-vascular system not only for the well but also for the sick. All have referred to the values of physical activity in keeping optimum health (15). Today, more number of people are becoming conscious about physical fitness than ever. No doubt, there are various physical training programmes which contribute to Cardio-vascular endurance and flexibility (12, 13), yet they are found to be hard and vigorous in nature and often lead to fatigue and strain.

Therefore, there is a need to find out some alternative training programme which would reduce physical and mental fatigue and would promote the feeling of well-being. Now-a-days Yogic practices are also looked upon as very favourable system of exercise by many. The studies thus far conducted show that yogic practices have very favourable effects on the general health and physical fitness (8, 9, 10). Our own earlier studies on Cardio-vascular endurance showed improvement in the subjects undergoing yogic training, (5, 6, 7) but there was no simultaneous control group used. The Toe Touch Flexibility test was also not administered earlier to see the changes resulting after Yoga practices.

The purpose of this paper, therefore, is to present the results of the effects of a short-term Yogic training programme of three weeks duration on the C–V endurance and flexibility level. More specifically the objectives of this study were :

1) To find out the present state of the subject in Cardio-vascular endurance and toe touch flexibility.

2) To determine whether general physical fitness index as measured through Harvard Step Test, would be improved with the short term yogic training.

3) To determine whether Toe Touch Flexibilitywould show significant improvement.

Materials and Methods :

Subjects : The study was conducted on Seventy subjects who were randomly selected out of 400 students from the residential Regional Police Training School, Khandala. They were clinically normal and had common routine and food. They were physically active but not highly conditioned through endurance training. Their mean age, height and weight were 23 years; 171.44 cms., 55.56 kg. respectively.

Test Administered : The Harvard Step (1) Test was selected to find out the status of the cardio-vascular system. This test was selected as a single good procedure for it is simple, non-expensive and does not require skilled and prolonged laboratory process (3, 16). To measure flexibility, Toe Touch Flexibility test was administered (4).

Procedure : The subjects reported in the laboratory for the tests in the morning without any food, drink or exercise prior to the experiment. The subjects (N=70) were tested on Toe Touch Flexibility test (4) before C–V test. The subject stood on the bench fitted with a centimeter scale, keeping legs and toes together in line with the edge of the scale. Then he bent forward as far as possible without bending at the knees. The score was the distance achieved on the scale where the subject held his fingers for two seconds. The more he went down, better was the achievement (4).

For measuring cardio-vascular endurance, the test was conducted on a 20 inches high bench (15). The subject went up and down the step 30 time a minute for 5 minutes or until forced to discontinue due to fatigue. After finishing the exercise pulse rates were measured for three and half minute intervals, namely, one to one and half minutes, two to two and half minutes, three to three and half minutes. The three pulse rates were added and converted into fitness index, using the following formula :–

$$\textbf{Fitness Index} : \frac{\textbf{Duration of exercise in seconds} \times \textbf{100}}{2 \times \text{Sum of three pulse counts.}}$$

The administration of the test was according to the procedure described by Willgoose (18). After the initial data collection the subjects were randomly divided into two groups of 35 each. One of the groups was randomly assigned to the experimental group and the other was treated as the control group. Both the groups were tested again after the **experimental period of 3 weeks.**

Yogic Training Programme : The training consisted of the following 14 selected Yogic practices : namely, Ardha-Halasana, Halasana, Naukasana, Viparitakarani to Sarvangasana, Matsyasana, Bhujangasana, Ardha-Shalabhasana, Dhanurasana, Vakrasana, Supta-Vajrasana, Chakrasana, Shavasana, Uddiyana Bandha, Ujjayi (Puraka-Rechaka).

Except the additional yogic training for the experimental group, both the groups were undergoing their normal routine of the school. The training for experimental group was conducted every day in the evening for the duration of 45 minutes and all Sundays were observed as rest days. Each Yogic practice was repeated thrice and the maintenance was insisted upon with some rest in between the practice.

Results :

Pre-experimental means of the fitness index scores and the Toe Touch Flexibility of the experimental and control groups were compared to see if there was any significant difference between the groups. No significant differences were found between the two groups, showing the two groups homogeneous.

A comparison of within group changes of the Harvard Step Test for experimental and control groups was made for the difference. The experimental group showed increase of + 6.6 points while the control group in same period showed significant decrease of 15.44 (Table-1). When these changes in the Harward Step Test between the control and experimental groups were compared, the difference of + 22.04 points was found to be statistically significant (Table-2). The Toe Touch Flexibility score improved by +3.53 in the experimental group while the change in the control group was only 0.75 which was not significant

(Table-1). When the changes between the two groups were compared statistically it was found that the difference of +2.78 did not reach statistical significance, although greater improvement was seen in the experimental group (Table-2)

Discussion :

It is generally seen that vigorous programmes of physical activities are always advocated to increase the cardio-vascular effiiciency. But training in Yogic practices which is not vigorous in nature, also helped to improve the cardio-vascular efficiency.

The results obtained from this study is a good indication of favourable effects of Yogic practices even for a short duration.

Although it is generally believed that the yogic practices contribute to the development of the flexibility, the results in our study did not reach the statistical significance. This may be due to the individual variability in the flexibility.

Conclusion ;

Within the limitations of the study, the following couclusions are supported by the data.

1. The subjects of experimental and control groups were found to possess initially high degree of cardio-vascular efficiency.

2. The treatment of three weeks' selected yogic routine helped to increase the cardio-vascular efficiency of the experimental group, while the control group lost after three weeks.

3. The study further suggests that a short routine of selected Yogic practices is equally good to increase the efficiency as seen in earlier studies (5, 6, 7.).

4. The Yogic training can safely be advocated for the improvement of the cardio-vascular endurance when vigorous physical exercise are not possible to be carried out.

5. The Toe Touch Flexibility showed a trend towards improvement in the experimental group though not statistically significant.

Acknowledgement :

We are grateful to Swami Digambarji, Director of Research for the encouragement in the work. We are also thankful to Dr. P. V. Karambelkar and Dr. M. V. Bhole, the past and present Joint Director of Research respectively for taking interest in this project. Special thanks go to Shri Ashok Patil, Principal, R. P. T. S. for the co-operation and giving all the facilities required for the study. The authors are also thankful to Shri Baban Yewale for technical help and to the R. P. T. S. students who volunteered as subjects and gave their whole hearted co-operation in this study.

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TABLE-I

Comparision of the post-experimental within group mean difference for endurance & flexibility

SOURCE	Experimental Group						Control Group					
	Pre Trg.	Post Trg.	Diff.	S. E. of Diff.	't' Value	Sig. Level	Pre Trg.	Post	Diff.	S. E. of Diff.	't' Value	Sig. Level
Sitting Pulse	67.60	62.34	-5.26	2.04	2.58	*	65.08	66.51	1.42	2.05	0.69	N.S.
Cardio-Vascular Endurance	102.3	108.9	+6.6	4.58	1.44	N.S.	101.31	85.87	-15.44	6.07	2.55	**
Toe Touch Flexibility	7.65	11.18	+3.53	1.32	2.6	*	8.69	9.44	0.75	1.16	0.65	N.S.

NOTE N. S. = Not Significant

* = Significant at 5% level

** = Significant at 1% level

TABLE - 2

Comparison of the Post Experimental Mean Differences for Endurance & Flexibility

SOURCE	Exptl. group Mean Diff.	Control group Mean Diff.	Diff.	S. E. of Diff.	't' Value	Sig. Level
Sitting Pulse	- 5.26	1.42	- 6.68	2.89	2.31	*
Cardio-Vascular Endurance	+ 6.6	- 15.44	+ 22.04	7.58	2.9	**
Toe Touch Flexibility	3.53	0.75	+ 2.78	1.76	1.58	N.S.

NOTE : N. S. = Not Significant
* = Significant at 5% level
** = Significant at 1% level.

Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 40 to 47,
October 1988, January 1989.

Bronchial Asthma-Management Through Practice of Yogasana and Pranayama

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Abstract :

Electrophysiological, Biochemical and Psychological studies on the effect of regular practice of Yogasanas and Pranayamas revealed to keep the bodily physical and mental condition in good health. In the present study an attempt has been made to see the effect of yoga practice on curative or management aspect of bronchial asthma. Twelve proven cases of abstructive type of bronchial asthma were studied using respiratory function tests and by clinical assesment. Results showed an improvement in nine out of twelve patients in both clinical and respiratory functions. This preliminary study indicated the efficacy of yoga practice in the management of bronchial asthma.

Key word : Bronchial asthma, Yogasanas, Pranayama and Pulmonary function tests.

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Introduction :

Ancient Indian literature 1, 2, 3 reveals that the main aim of yoga is to bring good to mankind through the attainment of physical and mental wellbeing and also to improve their physical and mental abilities. Earlier electrophysiological, biochemical and psychological studies showed that the yoga practice helps to achieve the efficient functioning of certain organs in the body to maintain homeostasis [4, 5, 6, 7, 8, 9] and to achieve the desired results by influencing or by voluntary control over the functioning of the internal organs of the body [10, 11, 12, 13, 14]. The optimum level of homeostatic condition is achieved through promotive, preventive, curative and spiritual means. However, it is not clearly known scientifically whether the yoga practice achieves its aim through curative means. It is estimated that in India 1% of the population is affected by the bronchial asthma [15]. As there were very few studies available in this field [16, 17] an attempt is made to study the effect of yoga practice on asthmatics using clinical assessment and respiratory function tests.

Material & Methods :

The present study consists of 12 proven cases of bronchial asthma selected from the outpatient department, having the duration of the disease ranging from one to ten years. Their ages range from 20 to 55 years; two of the patients are females. All the cases are treated as inpatients.

In the beginning those who were using modern medicines were slowly tapered off over a period of one week. Yogasana and pranayama practice is progressively introduced. Yoga therapy consists of five asanas and two series of pranayamas, carried out as per schedule shown in Table 1. The practices are carried out twice a day in the mornings and in the evenings. All patients are kept under the same diet and environmental conditions. The pulmonary function tests (PFT)–the vital capacity (VC), forced vital capacity in 1st second (FEV 1), maximum expiratory flow rate and maximum ventilatory volume (MVV) were studied using respirograph (Toshniwal & Co.,) and peak expiratory flow rate (PEFR) by Wright's flow meter [18].

Clinical findings such as number of attacks of breathlessness, sleep disturbance, response to allergic substances are observed daily and the pulmonary function tests are carried out once in every week with the highest of the three readings of PEFR registered every day, morning and evening in six of the twelve patients.

Results were classified under three groups, patients who showed an improvements in all the parameters of pulmonary function test and upto 75% improvement in clinical assessment as marked relief, those with moderate relief with no positive changes in two out of five parameters and 50 to 75% decrease in number of attacks of breathlessness and others under no relief with no PFT changes and less than 50% decrease in the symptoms.

Results :

Table II shows the summary of pulmonary function changes in percent as compared to pre–yoga treatment values in twelve asthmatics. Six of the twelve patients showe marked relief showing an increase in the PFT parameters studied, while three patients showed moderate relief by showing an increase in all PFT's excepting FEV^{1} and the remaining did not show any improvement in the pulmonary functions.

Clinical assessment of the patients, who showed an improvement had decreased number of asthmatic attacks and undisturbed sleep to those patients who did not show any relief.

A three month follow up of these patients indicated the maintenance of these improvements in respiratory functions.

Discussion :

From the results it is evident that the Yogasanas and Pranayamas have a vital role to play in the management of bronchial asthma. Recovery might be by bronchodilation by correcting their abnormal breathing patterns. Due to improved breathing pattern respiratory bronchioles may be widened and perfusion of a large number of alveoles can be carried out efficiently. The development of bronchoconstriction in response to environmental stimuli is higher in patients with bronchial asthma than the healthy subjects.19 So this reduction in responsiveness of airways might have benefited these patients.

Further due to deep and controlled breathing, desensitization of the sensory nerve endings may be involved and this in turn might have helped to reduce the allergic condition to the environment. There is also an evidence from other studies that the practice of yogasanas for a period of three months re-established hormonal imbalance14 and recovery from bronchial asthma15. Though the results are encouraging the further work in this field is suggested.

Acknowledgements :

Authors are thankful to Dr. G. Mohana, Medical Officer, for the clinical help.

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TABLE – I

YOGA THERAPY

Yoga Therapy	Each Sitting	Total Duration
I Asanas :		
1. Vajrasana	5 Times	5 Minutes
2. Supta Vajrasana	5 Times	5 Minutes
3. Bhujangasana	2 Times	6 Minutes
4. Sarvangasana	2 Times	6 Minutes
5. Savasana	2 Times	10 Minutes
II Pranayama :		
1. Rechak–Purak (1 : 1)	Once	10 Minutes
2. Purak : Kumbhak : Rechak (1 : 2 : 2)	Once	5 Minutes

* These Asanas and Pranayamas are carried out twice daily.

Percent change in Pulmonary Functions and Clinical Evaluation

Patient Age/Sex	VC	FEV 1	MEFR	MVV	PEFR	Clinical Improvement
OM 33/M	13.3	8.5	57.1	40.8	NR	Marked Relief
DR 45/M	40.0	25.0	500.0	104.0	183.0	Marked Relief
BN 54/M	83.3	23.7	237.0	75.0	NR	Marked Relief
VJR 25/M	13.1	10.7	10.7	13.3	20.0	Marked Relief
PR 45/M	15.0	24.1	266.0	11.4	NR	Marked Relief
PB 30/M	13.6	17.1	33.4	1.8	1.4	Marked Relief
SS 26/M	24.6	– 1.3	50.0	25.4	NR	Moderate Relief
TSR 51/M	19.3	–14.9	70.0	131.2	NR	Moderate Relief
GI 31/F	5.0	2.4	41.1	5.5	16.0	Moderate Relief
RR 50/M	0.0	– 2.9	– 15.0	– 15.0	2.4	No Relief
GH 50/M	– 1.3	– 1.8	0.0	– 14.3	NR	No Relief
AP	0.0	– 1.2	0.0	0.84	– 1.3	No Relief

NR indicates not recorded.

Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 48 to 58,
October 1988, January 1989.

Understanding of Kapalabhati and other related terms according to Yogic Sanskrit Texts with some comments

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Introduction :

During one of the experimental studies on Kapalabhati it was observed that different students as well as investigators were having different understandings about its technique and effects. Most of the participants agreed on the point of rapid exhalations with passive inhalations at the rate of 120 strokes per minute. However, subjects were seen to contract the abdominal muscles either above the umbilicus, around the umbilicus or below the umbilicus and the sound was mostly produced from the nostrils. In some it was from the glottis and in very few it was from the fore-head. Some subjects had a steady posture while others were seen to move different parts in different ways.

Most of the subjects as well as investigators looked upon Kaplabhati as a cleansing technique for the lungs, bronchial tree and the air sinuses. Some also felt that

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** Joint Director of Research, Kaivalyadhama. Lonavla. Initiated the idea of this work and responsible for completion of the Paper.

'Kapalbhati' was a good exercise for the abdominal muscles and the internal organs.

The term 'Kapalabhati' indicates shining of the 'Kapala' Sanskrit texts were found to describe it in that way. However, many books written in other languages have emphasized its effect on bronchial tree.

Therefore, it was proposed to study the technique and effect of Kapalabhati as available to us in important source books in different languages. Study of Sanskrit texts is presented in this article.

Materials and Methods :

Thirty seven Sanskrit books and five manuscripts related to yoga easily available to the authors and mentioning Kapalbhati were scrutinised for the description of its technique and effects. After the preliminary work, help of ayurvedic texts was taken to understand certain terms found in yoga texts. Help of Sanskrit scholars from Philosophico literary Research Department was also taken to understand sanskrit verses.

Observations :

Reference to Kapalabhati and similar terms were found in seven books and three manuscripts. The quotations have been reproduced in Appendix-1.

The term Kapalbhati was found in four placcs (2b, 7, 9, 10). Out of which reference numbers 7 and 10 seems to have quoted Hathapradipika (2b)

Reference number 3a refers to Kapalbhati as a heading only, but does not describe it in the text.

The term KAPALASHODHANA has appeared in reference numbers 2a, 3c, 4, 6 and 8. This term has been used to indicate the effect of Neti (2a, 4), Suryabhedana Kumbhaka (2c, 3b) and Kapalabhati (3a).

Other terms found were Bhalabhati (1), Kapalabhranti (3a, 3b), Kapala virchana (4) and vasantolika (5).

I. Description of Technique :

Following description was found in reference numbers 2a 3a, 7. 9 and 10 about the technique of Kapalabhati.

(१) (२) (३)
भस्त्रावल्लोहकारस्य रेचपूरौ ससंभ्रमो
(१) भस्त्रि (२) वा (३) सु

For Kapalashodhana at least three types of techniques could be ascertained as follows–

1. that of Netikriya H. P, II : 31, (4) SKS–67,
2, that of Suryabhedana (2c H. P. II : 49, 3c, H. R. V : 11, (6)
3. Associated with Rechaka–puraka, rapidly moving the kapala from right to left and vice versa (3b)

Even though Gheranda Samhita refers to Kapalabhati as a shatkarma after tratak and describes the techniques of other five kriyas in order, it mentions three techniques for Bhalabhati in place of Kapalabhati.

i) Vatkrama bhalabhati is very much similar to the technique of Suryabhedana as mentioned in H. P. II : 49, but without Kumbhaka.

ii) Vyutkrama and

iii) Sheet karma Bhalabhati is performed with water.

In the former, water is taken inside through the nostrils and brought out through the mouth and in the latter, it is taken in through the mouth and brought out through the nostrils.

Kapalabhati may be looked as Kapalashodhana for the sake of understanding the subject after comparing the techniques with other available techniques.

Hatharatnavali (3a, 3b) has used the terms Kapalabhranti while discussing Kapalabhati.

In Satkarmasangraha a reference was found to another term, Kapalavirechana to be brought about by smelling the fruit of Deodali.

II. About the effects :

Apart from the effect of Kapalabhati, Kapalashodhana and Kapalabhranti, other effects mentioned by different texts are summarised below :

i) Removal of Kaphadosa (1, 2a, 7, 10) and pitta dosa (3b).

ii) Destruction of worms (2b, 8), bacterias (4) and all diseases (3a, 6).

iii) Purification of Brahma chakra (3b) and glottis (9).

iv) Even though nine references have given a positive appreciation of Kapalabhati and Kapalashodhana, Siddhasiddhanta Paddhati has denounced its practice while mentioning vasantolika. It mentions that the practice of वसन्तोलिका leads to depression and confusion (भ्रान्त) – A commentary on S. S. P. by Bhat and Agharkar.

Discussions :

1. One has to get acquanted with the following technical terms in order to develop proper understanding of Kapalabhati from Sanskrit texts.

a) Kapala – i. e. the skull. In popular language it also means the region of the fore–head, frontal region of the brain.

b) Kapaladosa–All those factors, either material or otherwise, which can lead to the impairment of the functions of the Kapala (brain).

c) Kapalashodhana – (Sensory or motor)

  i) Purification of Kapala in such a way so that its functions may not disturb the feeling of balance and equilibrium.

  ii) Freedom of the kapala from all impediments to the rising of Prana up there (similar as nadisuddhi).

d) Kapalabhati–Shining of Kapala so that it could give rise to experiences of intensive nature without disturbing the state of balance aud equilibrium.

e) Kapalavirechana – Emptying or purging of the Kapala through irritation or stimulation by means of external agents (Deodali fruit).

f) Bhalabhati and Bhalabhranti – These are similar terms having the meaning of Kapalabhati and Kapalabhranti.

2. a) Kapalashodhana could be done with the help of water or slow breathing as in suryabhedana while rapid breathing (Rechaka–Puraka) like a

black smith's bellow and has been advocated for Kapalabhati. However further details of this technique are not available in these texts.

b) Looking to the sequence of six cleansing processes as mentioued in different texts (H. P. II : 22, G. S. I : 12) it seems that Kapalashodhan should preceed Kapalabhati.

c) Kapalashodhan presumes Kapaladosas. However, no text mentions the nature of Kapaladosas anywhere.

d) Reference to the removal of Kapha–dosa in Kapalashodhana and Kapalabhati is found in four places while removal of vatadosa in one place. It does not become clear as to whether these dosas belong to Kapala or the whole body ?

3. Comments based on practical observations :

In a class room, if one tries to examine the technique of Kapalabhati as followed by the students and as demonstrated by the teachers, one finds that the sound produced during Kapalabhati seems to be coming from one of the regions of the body i. e.

a) from the throat as in ujjayi

b) from the nose as comes while cleansing the nose and

c) from the forehead.

It is sincerely felt that in Kapalabhati, the sound should look to be as if, coming from the fore–head region.

(2) Both the terms Kapalabhati and Kapalabhranti and even the term Kapalsodhana seems to have a strong experiential base (sensory aspect). While most of the time, especially the beginners, the students are seen to completely overlook this aspect of Kapalabhati may be because due stress is not given on this aspect and only the action part (motor aspect) is given too much prominence in teaching and demonstrating this technique.

(3) If one tries to experience the touch of air during ordinary breathing, one will find it to be restricted to the lower 2/3 of the nasal passages. In order to experience its touch in the upper 1/3 part (the olfactory area of the nose), one has to modify the direction of air current in such a way that it also goes upwards to touch the roof of the nose containing olfactory nerve endings. In the absence of any odour in the air, and if the person is sensitive enough, one may be able to feel the touch of air in that region which can be indicated as the back of the fore-head on the surface.

One can feel the touch of air in the same region during expiration. Usually the experience is slightly different than the one possible during inspiration. Therefore, one is inclined to use force and to stimulate this area for better appreciation.

Conclusion ;

Review of the Sanskrit texts and commentaries related to Hatha yoga refer to the terms like Kapalashodhana, Kapalabhati, Kapalabhranti, Kapalavirechana, Vasantolika, bhalbhati, bhalabhranti while describing Neti, Kapalabhati and Surya-bhedana. Directly or indirectly these practices are related with the subject of Pranayama.

It is felt that Kapalashodhana i. e. purification of Kapala (head, fore-head, skull, brain, frontal brain) seems to preceed Kapalabhati (i. e. shining of Kapala).

The term Kapalabhati is indicative of process, effect or a result rather than a mere technique.

As a technique, Kapalabhati consists of rapid rechaka-puraka like a black-smith's bellow.

The technique should be coupled with the effect for educational / therapeutic application and evaluation of Kapalabhati.

APPENDIX 1

Quotations from different Sanskrit Texts and MSS.

1. **Gheranda Samhita :** (अथ भालभाति)

वातक्रमेंण, व्युत्क्रमेंण शीत्क्रमेंण विशेषतः ।
भालभातिं त्रिधा कुर्यात्कफदोष निवारयेत ।। १–५४ ।।

2a. **Hathapradipika :** (अथ नेतिः)

कपालशोधनीचैव दिव्यदृष्टि प्रदायिनी ।
जयुर्ध्वं जातरोगौद्यं नेतिराशु निहान्तिच ।। २ : ३१ ।।

2b. (अथ कपालभाति)

भस्त्रा वल्लोहकारस्य रेचपूरौ ससंभ्रमो ।
कपालभातिर्विख्याता कफदोष विशोषर्णा ।। १ : ३६ ।।

2c. (अथ सूर्यभेदन)

कपाल शोधनं वातदोषघ्न कृमिदोषहृत ।। २ : ५० ।।

3a. **Hatharatnavali** (अथ कपालभातिः)

भास्मिवल्लोहकाराणां रेचपूर सुसंभ्रमौ ।
कपालभ्रान्तिर्विख्याता सर्व रोगविशोंषर्णा ।। १ : ५४ ।।

3b. कपालं भ्रामयेत्सव्यमपसव्यं तु वेगत : ।
रेचपूर्वक मुक्तेन कपालभ्रान्तिरूच्यते ।। १ : ५५ ।।

3c. (सूर्यभेदन कुंभक)

यथेष्टं कुंभयेद्वायू रेचयेदिडचा ततः ।
कपालं शोधनंवापि रेचयेपवनं शनै : ।। १ : १२ ।।
Hatha Sanket chandrika
Jyotsna Commentary on H. P.

4. **Satkarmasangraha** (अथ नेति)

देवदालीफल घ्राणं कपालस्य विरेचनम् ।। ३५ ।।
कपालशोधिनी दृष्टीशोधिनी जन्तुनाशिनी ।। ६८ ।।

5. Siddha Siddhanta Paddhati

(वसन्तोलिका। ये कुर्वन्तिच कारयन्निच
सदाभ्राम्यन्ति खिद्यान्ति ते ।

6. **Shandilyopanishad** (कपालशोधनोपायः)

सुखासनस्थो दक्षनाडचा बहिस्थं पवनं समाकृष्या
केशमानखाग्रं कुंभयित्वा सव्यनाडचा रेचयेत् ।
तेन कपालशोधनं वातनाडीगत सर्वरोग
विनाशनं भवति ।। १३ : १ ।।
Vallabhacharya's commentary on P. Y. S.

7. Yoga chintamani (MSS) (अथ कपालभाति)

भस्त्रेंव लोहकाराणां रेचपूरी ससंभ्रमौ ।
कपालभाति विख्याता कफदोष विशोषिणी ।।
Quoted Hatha-Pradipika

8. **Yoga Kundalyupanishad** (अथ कपालशोधन)

कपालशोधनेवाऽपि रेचयेत पवनं शनैः ।
चतुष्कं वातदोषं तु कृमिदोष निहान्तिच ।। १ : २५ ।।

9. Yoga Ratna Pradipika MSS. (अथ कपालभाती)

भस्त्रेव वाहकारस्य रेचपूरौ ससंभ्रमौ ।
कपालभाती व्याख्याता कण्ठदोष विशोषणी ।।
Yoga Siddhanta Chandrika.

10. **Yukta Bhavdev–by Bhavdev : Same as in H. P. except कपालभातिः Mss.**

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A. Description of Kapalabhati found in Traditional Texts.

1. Gheranda Samhita
2. Shandilyupanishad
3. Siddha Siddhanta Paddhati
4. Hatha Pradipika
5. Satkarma Sangraha
6. Yoga Chintamani
7. Yoga Kundalinyupanisad
8. Hatharatnavali
9. Yukta Bhavadeva
10. Yoga Ratnavali
11. Jyotsna Tika on H. P.

B. Description of Kapalabhati not available in Traditional Texts.

1. Goraksa Paddhati
2. Goraksa Satakam
3. Chhandogyupanisad
4. Tatva Vaisharadi
5. Tejobindupanisad
6. Taitriyupanisad
7. Dhyanabindupanisad
8. Nigam Tatvasara
9. Patanjali Yoga Sutras
10. Bala Prabhodhini
11. Bruhadaranyaka
12. Bhrama Sutra
13. Bhagawat Gita
14. Yoga Chudamani
15. Yoga Tarangini
16. Linga Purana

17. Vyasa Bhasya
18. Shiv Samhita
19. Satchakra Nirupana
20. Yoga Bijam
21. Kapal Kurantaka
22. Vasistha Samhita
23. Brahadyogiyajnavalkyasmrti
24. Shri Shiva Swarodaya
25. Yogasikhopanishad
26. Darsanopanishad

ACKNOWLEDGEMENTS

Authors are thankful to Swami Digambarji, Director, Dr. P. V. Karambelkar, Shri O. P. Tiwari and Dr. M. V. Rajapurkar for their encouragements and valuable suggestions. The valuable co-operation and other assistance while preparing this paper from P. L. R. D. staff members especially Dr. B. R. Sharma and Shri R. R. Sharma as well as from Shri P. A. Date and Shri V. K. Kulkarni, is also gratefully acknowledged.

Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 59 to 66,
October 1988, January 1989.

Aṣṭamagga and Aṣṭāṅgayoga : A Comparative Study

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In the tradition of Indian Philosophy, spiritual thinking occupies a very important place and among them Yoga and Bauddha philosophies are even more important specially from the point of meditational techniques. Maharṣi Patañjali, a promoter of yoga, pointed out 'aṣṭāṅgasādhanā' for over-coming 'sarvaṁ duḥkhaṁ vivekinaḥ'[1]. Similarly, Buddha also described 'aṣṭamagga sādhanā' for destruction of 'sarvaṁ duḥkham'.

The essence of Lord Buddha's preaching lies in his Four Noble Truths[2]. These are,–'There is misery; There is cause for misery; There is cessation of misery; and There is path leading to the cessation of misery. However, the paper is more concerned with his Fourth Noble Truth in which he promises a sure shot way to bring about the cessation of misery. This way is popularly known as aṣṭamagga. This eight-fold noble path consists of – (1) Right View (sammādiṭṭhi). (2) Right Resolve (sammāsaṅkappa) (3) Right Speech (sammāvācā), (4) Right Conduct (sammākammānta), (5) Right Livelihood (sammā–ājīva), (6) Right Effort (sammāvāyāma), (7) Right Mindfulness (sammāsati), and (8) Right Concentration (sammāsamādhi). As the pot remains steady when supported but topples easily when it is without support, similarly here the support of citta is aṣṭamagga.[3]

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1. Right View (sammādiṭṭhi)[4] : After knowing the root-cause of misery, leaving the view born out of ignorance due to which one sees perishable, miserable and soulless as unperishable, pleasure-giving and with soul respectively, and the knowledge of truth is the Right View (sammādiṭṭhi).

2. Right Resolve (sammāsaṅkappa)[5] : A mere knowledge of truth leads nowhere, the determination to reform life accordingly, renouncing worldliness, giving up illfeeling towards others, and desisting from doing any harm to others (hiṁsā) etc. is the Right Resolve (sammāsaṅkappa).

3. Right Speech (sammāvācā)[6]. To put the above-mentioned Right Resolve to action which leads to abstention from lying, slander, unkind words and frivolous talk is Right Speech (sammāvācā).

To give the practical form to the above mentioned Right Speech and thereby following the five vows.

4. Right. Conduct (sammākammānta)[7]. To give the practical form to above mentioned right speech and thereby following the five vows, i. e., non-violence, non-stealing, control over sense-organs, truth and avoidance of intoxication is Right Conduct (sammākammānta).

5. Right Livelihood (sammā-ājīva)[8] : For the sake of maintaining one's life one should resort to pure and proper means and avoid forbidden means. This is right livelihood (sammā-ājīva).

6. Right Effort (sammāvāyāma)[9] : A constant effort to root out old evil thoughts, and prevent evil thoughts from arising anew, a constant endeavour to fill the mind with good ideas and retaining such ideas in mind is Right Effort (sammāvāyāma).

7. Right Mindfulness (sammāsati)[10] : Constantly bearing in mind the things already learnt. Remembering to see unperishable as unperishable and perishable as perishabla is Right Mindfulness (sammāsati). This non-attachment towards things leads one towards freedom from worldly bondage.

8. Right Concentration (sammāsamādhi)[11] : In this last path there are four stages. In the first the sādhaka experiences joy and ease born of detachment and pure thought. In the second state, there are joy, peace, and internal tranquillity born of intense, unruffled contemplation. In this stage, there is still the consciousness of this joy and peace. In the third stage, there is detachment from even the joy of tranquillity but feeling of bodily ease still persist. In the fourth stage, there is detachment from this bodily ease too. There are then perfect equanimity and indifference. This is the state of nibbāna or perfect wisdom.

'Yogasūtra' of Patañjali is considered to be the oldest among the available literature on yoga. In this text, Maharṣi Patañjali has discussed eight aṅgas[12] of yoga such as yama–niyama etc. This aṣṭaāṅgayoga can be described in nutshell like this : Yama–niyama are for purification of place, purification of behavior, and to some extent they are means to control the sense–organs. Āsana and prāṇāyāma are meant for purification of body, stability of body and prāṇa and for removing fickleness of citta. Pratyāhāra and dhāraṇā are means for the sense–organs to become one with citta and to get stabilised at one place. This stabilised state of citta if continued for a long period leads to complete restraint of citta and this state is called dhyāna and samādhi.

The discriminative knowledge attained as a result of cittavṛttinirodha leads one to think that everything is full of misery[13]. But here does not end the story of yoga or it is not the end of the journey. One must continue the practice of sādhanā till he attains nirbīja and thereby kaivalya[14]. And aṣṭāṅgayoga is meant for the attainment of this kaivalya.

Actually yoga is an ancient science of psychology. Through yogasūtra and its commentaries written by Vyāsa etc., on it, we get the knowledge of internal organs and the knowledge of how they can be fully developed. Due to this the yogī gets so many means that he can very easily enter into his own world and can move forward towards attaining ultimate aim of the life.

Almost all the Indian philosophies[15] accept the world as miserable, consider it as perishable (anitya), and try to find out the means for duḥkhanirodha and duḥkhanivṛtti as ultimate puruṣārtha. But they do not agree on the point regarding the ways to duḥkhanirodha.

The 'aṣṭamagga' and aṣṭāṅgayoga' way to duḥkhanirodha described by Buddha and Patañjali though not completely identical have many similarities. For example, (1) in both, the avidyā is considered to be the main cause of all the duḥkha : its destruction in one has been described as sammādiṭṭhi and in the other as vivekakhyāti; (2) both have considered the nirodha of cittavṛtti as their aim; (3) for that both have shown eight ways; (4) the last aṅga of both is samādhi: (5) the five types of yama told by Patañjali have also been described by Buddha with great importance. In Dhammapada, violence (hiṁsā) lie (asatya), stealing (steya), non-celibacy (abrahmacarya) and drinking of wine (madyapāna) which with some difference be considered as storing (parigraha), are considered very opposite to nibbāna and the sādhaka making efforts to remove them is considered to be a sādhaka[16] of the Nibbāna Path. Due to the strong opposition for violence in Bauddha religion, Vyāsa has not only given more importance to non-violcnce than truth (satya) etc., but also have accepted truth etc. as supporter to non-violence.[17] Similar to śauca (cleanliness) etc., niyama in Bauddha literature also there is detailed discussion on śauca (clealiness),[18] santoṣa (contentment), indriyanigrah (tapas) etc.

Therefore, in short, it can be concluded that as Patañjali has accepted importance of yama-niyama for moral teaching, that is also considered important in Bauddha tradition whereas in other philosophies like Sāṁkhya, Nyāya, Vaiśeṣika etc., this explicit moral teaching is not taken care of. Hence many principles related to morality are considered equally important in Bauddha and Yoga Philosophies.[19] Similarly in any words are used in Yoga-sūtra which are mostly not used in any other Indian philosophies, but in Bauddha tradition they are amply found. For example, viparyaya, vikalpa, karmāśaya, Karmavipāka, samprayoga etc. Therefore, on the basis of these facts it will not be improper to think that both the philosophies are developed simultaneously in a friendly atmosphere.

The practice of aṣṭamagga of Buddha which are mostly in the form of mental practice bestows the freedom from pain and nibbāna is attained. According to him, no creature of this world is free from pain as this world is full of pain. For following the path which removes the pain, his first and essential condition is renouncing the world and to become a medicant. Then only the sādhaka can start the practice of these aṣṭamagga, an originator of duḥkhanirodha.

Freedom from pain is also the aim of Patañjali. He also desires to attain ultimately that highest knowledge (vimala-viveka) only through cittavṛttinirodha so that there is this awareness that 'everything is full of pain'. Then after achieving a vivekakhyāti, avidyā is destroyed and kaivalya-a complete freedom from pain is attained. But there is some difference in means to attain it. Patañjali has included most of the ways of aṣṭamagga in his yama-niyama. He believes that for progress in mental practice there is a necessity of psycho-physical practices also. Therefore he has stated two important aṅgas named āsana and prāṇāyāma which leads to a particular mental state. As a result of their practice, pratyāhāra, dhāraṇā, dhyāna etc, a pure mental practices and ultimately after complete control cittavṛttinirodha, samādhi and duhkḥanivṛtti is attained and in the words of Buddha a stage of 'sammāsamādhi' is attained.

As far as the sādhaka is concerncd there is not much difference of opinion between Patañjali and Buddha. Where Buddha considers sannyāsis suitable for his sādhana, there Patañjali though not talking about renouncing world considers cittaprasādana essential. And if the sādhaka has achieved the cittaprasādana then he remains indifferent towards world though living in the same world just like a lotus in the water. Hence it can be concluded that for following both the methods of sādhanā there is hardly any difference regarding the sādhaka. At the same time, it can be said that where the method of sādhanā of Buddha starts with a particular type of outer dress, environment etc., there of Patañjali, considering internal personality important, tries to make his method of sādhanā from outward, easy for all.

In this way though coming out from the same root (śrota) there seems enough difference on the gross level in the aṣṭamaga sādhanā of Buddha and Patañjali, due to which an ordinary man may doubt that these two are completely different ways. As such, it can be true to some extent. For example, (1) Buddha's emphasis for a particular type of sādhaka; (2) statement of way leading to only mental practice. But study on subtle level makes it clear that there is hardly any difference between these two methods. But still it can be concluded that the method of Patañjali in itself is more methodical, scientific, full of nivṛtti and conducive even for ordinary man.

References :

1. Yogasūtra II 15.
2. Abhidhammakośabhāṣya 3/44 (p. 157, 874).
3. Saṁyuktanikāya 5/21 (p. 19).
4. Atta 3/322 (p. 102).
5. Visu. 17/77 (p. 356).
6. Dīrghanikāya 2/312 (p. 233).
7. Dīrghanikāya 2/312 (p. 233).
8. Atta 3/472 (p. 177).
9. Aṭṭa 3/232 (p. 102).
10. Dīrghanikāya 2/312 (p. 233).
11. Majjhimanikāya 1/301 (p. 371).
12. Yogasūtra II 25–55; III 1–4.
13. Yogasūtra II 15.

14. Yogasūtra IV 29.
15. Pātañjalayoga per Bauddhadharma kā prabhāva (p. 40).
16. Dhammapada 5/24–25.
17. Yogabhāṣya (p. 249).
18. Dhammapada 10/10.
19. Pātanjalayoga par bauddhadharma kā prabhāva (p. 44–49).

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Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 67 to 73,
October 1988, January 1989.

“te samādhāvupasargāḥ...”

“ते समाधावुपसर्गाः.....”

(P. Y. S. III. 37)--A Re-visit

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The Patanjala Yoga Sutra is divided into four chapters and each chapter is woven in such a way that no chapter of Yoga Sutra can be understood without the help of the other ones. In other words, it can be stated that each chapter forms an integral part of the whole yogasutra. The Sutra—“te' samādhāvupasargāḥ vyutthāne siddhayaḥ” —the title of the present paper—belongs to the Vibhūti Pāda, and it is this Sutra which has apparently reduced the significance, essentiality, and importance of the whole chapter. Almost all the commentators on Yogasutra have thus unanimously condemned the importance of Vibhutis.

Vyāsa comments on it as follows : “te prātibhādayaḥ upasargāḥ taddarśana pratyanīkatvāt..” The Sutra and its Vyāsabhāṣya have been translated in the following way: “These are obstacles in (the way of) communion; but perfections in the distracted state” (Sutra III. 37). Bhāṣya : “These, that is, the intuitional and other abnormal perceptions appearing in the composed mind become ‘obstacles’ as they obstruct the clear perception (of the Spirit) by the mind. But when they come to men with their mind still in the ‘distracted’ state, they are so many perfections (powers)”.

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The commentary and its English translation clearly indicate that these supernormal powers or better to say in its technical term 'Vibhūti' work essentially as obstacles in the achievement of highest goal of yoga. But the author of the present article contends that the meaning of this Sutra and its Bhāṣya should be re-examined. This contention is amply supported externally by the space Patanjali has devoted for the discussion of Vibhūtis in this Pāda. If Vibhutis are essentially obstacles then what is the propriety of enumerating the different Saṁyamas and their consequences in the form of different vibhūtis. It is also noteworthy that these vibhūtis are not simply enumerated as a matter of course because they are phenomena arising along the path of yoga, but, the presentation seems to be as if they are to be practically utilized by the Yogin for a better cause. These were the thoughts that led the author to reconsider the meaning and purport of the sutra quoted above.

So, in order to understand the meaning of the Sutra, let us first analyse its each word and its possible interpretations.

(1) 'te'—The first word of the Sutra has been interpreted by Vyasa as—'te prātibhādayaḥ......' This clearly establishes an essential relation of this Sutra with that of its preceding ones ('prātibhaśrāvaṇa... etc.' III. 36).

If 'Prātibha etc.' only have been indicated by 'te' then only 'Prātibha etc" should be considered as 'Upasargas' (obstacles) for Samadhi. In that case, it can be argued that other Saṁyamas and its Vibhūtis enumerated after this Sutra (III. 37) should not be considered as Upasargas for Samadhi.

(b) There are some commentators like I. K. Taimini who consider 'te' to be representing all the Vibhutis enumerated in Vibhuti Pāda and they consider all the vibhutis to be upasargas for samadhi. This interpretation does not seem to be a proper one as the sutra's position in the Vibhuti-pada cannot be justified. For, the 'te', then may denote even the perfections enumerated in Sādhana-Pada under Ahiṁsā, etc. (Sutra II 35-45)

c) If all the vibhūtis are Upasargas for Samādhi. then it would have saved the time and energy, both, for Patanjali, if he would have simply stated that all the Vibhūtis are Upasargas by framing a common aphorism such as "Vibhūtayaḥ samādhāvupasargāḥ". But it is a questionable matter whether Patanjali also approves of such an idea. So according to the placement of the sutra in the vibhūti-pāda, it cannot be said that the term 'te' here represents all the vibhutis, and it must have essential relation with preceding sutra.

(2) The next term in the sutra is 'samādhau'. This term needs a clear-cut interpretation as to what can be its most suitable meaning. There are three varieties of Samādhi—sabīja, nirbīja, and dharmamegha. Commentators like Vyāsa have divided Samādhi into two broad varieties :- (1) Saṁprajñāta and (2) Asaṁprajñāta. Here the question arises—this 'te' are upasarga for which Samādhi ? a) With reference to Vyasa-bhasya, the word Samādhi here stands for Kaivalya. Vyāsa says— "They are upasargas in the clear perception of the spirit," This state can be equated with the state of Kaivalya or Dharmamegha-samādhi. Thus on the line of

Vyāsa, it can be safely stated that Samādhi here does not refer to Sabīja or Nirbīja.

(b) There can be a different interpretation of the word samadhi. Saṁyama is practised during the state of Sabīja-samādhi and 'te' (Pratibha etc.) can be considered upasarga for the perfection in Sabīja-samādhi.

Thus the term 'Samādhi' can be interpreted either as —(1) Dharmamegha-Samādhi or (2) Perfection in Sabīja-samādhi.

(3) The third most important, and for that matter the key-word of the Sutra, is the term 'upasarga' itself. Conspicuously, upasarga have been taken to mean 'obstacles' by all the commentators of yogasutra. Perhaps, by following blindly the Vyāsa-bhāṣya, all the successive commentators have considered this word to be a synonym of 'vighna'. But there arise certain problems if we enjoin the meaning 'obstacle'with upasarga.

1. Does Patanjali's Yoga provides a way out to overcome such Upasargas ? Arguement proceeds in this manner—

a) According to Patañjali, intense practice of dhāraṇā-dhyāna-samādhi leads to Saṁyama which is an essential and desirable state of yoga practice,

b) Saṁyama is bound to produce respective vibhutis as its consequences; and,

c) one cannot avoid the practice of saṁyama.

Thus, it can be stated that vibhutis will always work as obstacles and as far as Patanjala Yogasutra is concerned it has not suggested any way to overcome those obstacles.

2. We will have to accept two varieties of vibhutis (1) Vibhutis enumerated prior to the Sutra III.37, and (2) vibhutis enumerated after the above sutra. Thus the first variety of vibhutis will be considered to be obstacles whereas the other as non-obstacle veriety of vibhūtis. But, again, this division is not acceptable to several scholars mentioned above, for they conceive all the vibhūtis to be 'obstacles'.

3. The Sutra loses its very significance when the second part of the Sutra, will be considered merely as complementary to the first part of the Sutra —'vyutthāne siddhayaḥ...hence 'te samādhā-vupasargāḥ'.

The author of this article feels that the meaning of the word Upasarga itself should be re-examined. It is quite possible to conceive that by the time of Vyasa the word Upasarga might have become established in the sense of obstacle as is the case with the words such as 'pravīṇa', 'kusala' etc. These words were not used initially in the same sense as they are being used now-a-days. The case with the word Upasarga also seem to be similar. This arguement is strengthened when we go for the derivative meaning of the word–

upa – sṛja – ghañ

'upa' means 'near' and 'sṛja' means 'to create'. Thus 'Upasarga' will be – 'That which creates a situation which leads near to' or 'symptom' or 'upa-lakṣaṇa'.

If the above meaning is accepted, then the meaning of the Sutra becomes more tenable–'te samādhāvupasargāḥ:' : They are Upalakṣana or symptom of getting near 'perfection in Sabīja-samādhi' or 'Dharmamegha-samādhi'.

In this way, it can be said that 'prātibha etc.' vibhutis serve as milestones in the path of spiritual goal.

As one attains perfection in one samyama, he crosses one milestone, and in this way, there are several milestones in the form of vibhutis which are to be attained by a yoga practitioner necessarily. This interpretation of upasarga also justifies the meaning of the second part of the Sutra, i. e., 'vyutthāne siddhayaḥ' : 'these can be used as siddhis for worldly purposes.'

Vysas' commentary on this part of the sutra again creates a problem. Vyasa writes : "vyutthita cittasya utpadyamānāḥ siddhayaḥ' which has been translated in following ways—

(1) "but when they come to men with their mind still in the distracted state, they are so many perfections (Ganganath Jha...page 199);

(2) (but) arising (in the Yogin) whose mindstuff is emergent, they are perfections' (James H. Woods, III.37).

(3) 'When they are produced of an exhibitive mind, they become the accomplishments (Bengali Baba on Yoga Sutra and Bhāṣya, III. 36).

Vyasa, as per the above quoted translations of his Bhāṣya, seems to say that vibhūtis may appear in the distracted state of mind and they work as siddhis. But the question arises as to whether a person having distracted state of mind can achieve the samyama state and thereby attain vibhutis ? The author contends that Samyama is a state of higher concentration and till the distracted state of mind continues, the saṁyama cannot be practised. Thus Vyasa's commentary on 'vyutthāne siddhayah' is again subject to re-examination.

Conclusion ;

In the light of the above discussion, the Sutra will mean—

te – Prātibha etc. (are)
Samādhau – for the sake of (1) perfection in sabija-samadhi, (2) Dharmamegha–samādhi;
upasargāḥ - symptoms, upelakṣana or milestone;
vyutthāne – (during) distracted state;
siddhayaḥ – perfections, accomplishments.

Sage Patanjali has cautioned the practicants through the second part of the sutra that though the enumerated vibhutis are milestones or upalakṣanas for samādhi, yet they can be used as perfections for worldly purposes during distracted state, that is, when he releases the saṁyama–state. And then they can distract a person from their goal.

According to yoga philosophy, Kaivalya consists in the realization of the nature of self (purusa). Such a realization is a journey from vṛtti–sārūpya state to the state of svarūpa–avasthānam. For such a realization the supreme knowledge that puruṣa is distinct from prakṛti is necessary. Such a discriminative knowledge 'vivekakhyāti' requires a thorough awareness of gross and subtle forms of prakṛti. And it is through Saṁyama and Vibhutis, the sādhaka attains the awareness of the totality of prakṛti which enables him to realize his svārupāvasthā.

Thus, to conclude, Vibhutis, far from being obstacles, on the contrary, are necessary requirements for the attainment of yogic **summum bonum.**

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Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 74 to 80,
October 1988, January 1989.

Yoga and Massage

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Scope of the Terms :

Yoga is more known as various practices which include Asanas, Pranayamas, Bandhas, Mudras, Kriyas and Relaxative techniques. These techniques are essentially individualistic and are actively undergone.

Massage is a passive exercise. It involves pressure and movement manipulation. The main purpose of massage is to remove the toxins or waste matter resulting in the body from inadequate movements. Therefore, the technique of massage involves the application and movement of pressure along the veins in the direction of the heart.

Various kinds of Massage :

The element of vibration is very important in Massage which brings healing. Through massage injured limb returns to the correct vibrational pattern which is associated with normalcy of function. The vibratory effects of massage are caused by very light pressure in massage which is done by fingers. The movements in massage are classified as follows :

1. Effleurage or stroking in which hand is moved in one direction only.
2. Petrissage or kneading which consists of rolling, squeezing and rubbing with fingers or the thumb.

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3. Tapotement or a vibratory movement.
4. Thrusting
5. Hacking.

Nature itself has provided for automatic massage of the different vital organs of the body which may be termed as Natural Massage.

Effects of Massage :

1) **Improvement in Circulation :**

Massage dialates the blood vessels by giving mechanical and alternate pressure and relaxation. This improves venous and lymphatic return.

The number of red blood cells are increased, especially in cases of anemia.

Just beneath the skin is a layer of fascia, a substance like the fine white network that is under the skin of an orange. There is also a fascial layer around each group of organs, each organ and each tissue within the organ down to the single muscle fibre. Each has its own wrapping. When a muscle becomes chronically tense, these fascial envelopes dry up and become immobile. To reach the muscles it is necessary to stimulate the fascial layers, restore their blood supply and mobility. This is achieved through massage.

2) **Promotion of Purification :**

Massage relieves congestion throughout the body. It acts as a "mechanical cleanser" by stimulating lymph circulation and hastening the elimination of wastes and toxins built up from strenuous exercise or injury.

Massage increases the excretion of fluilds and waste products of protein metabolism, inorganic phosphorus and salt in normal individuals.

It removes harmful deposits from joints and helps reduce inflammation and swelling in joints and also alleviates pain.

Massage helps to reduce edema of the extremeties and edema following injury to ligaments and tendons and facilitates movement with reduced pain.

By improving circulation and nutrition massage breaks down or prevents formation of adhesions and reduces the danger of fibrosis.

3) Improvement in Nutrition :

Massage by improving the general circulation increases nutrition of the tissues. It is accompanied or followed by an increased inter-change of substances between the blood and tissue cells improving tissue metabolism.

Massage encourages the retention of nitrogen, phosphorus and sulphur necessary for tissue repair in persons convalascing from bone fractures.

4) Improvement in the Muscle tone :

Massage improves muscle tone and helps or delay muscular atrophy resulting from forced inactivity.

5) Massage is compensatory to exercise :

Massage can compensate, in part, or lack of exercise and muscular contraction in persons who because of injury, illness or age are forced to remain inactive.

Massage can have sedative or stimulating or even exhausting effect on the sensory nerve endings of the skin, depending on the type and length of massage given.

6) **Relaxation :**

Massage relaxes muscle spasm and relieves tension. It helps venous return of the blood to the heart and so reduces the strain on this vital organ.

7) **Helpful in diseased conditions :**

Massage is helpful in conditions like neuralgia, neuritis, rheumatic and sciatic conditions, Bell's Paralysis, hysteria and very wide varieties of muscular disabilities. Constipation and obesity are also amenable to massage. According to some authorities, massage may burst the fat capsules in sub–cutaneous tissue so that the fat exudes and becomes absorbed. Massage combined with a nutritious but low calorie diet can aid in reducing the fat.

Massage improves digestion and promotes assimilation process.

It contributes to the brightness of the skin.

In general, massage contributes to the feeling of well being.

Yoga and Massage :

The natural process of automatic massage is further promoted by the various Yogic practices.

The inhalation and exhalation by means of the movements of thoracic diaphragm is an excellent example of natural massage. During exhalation the thoracic diaphragm moves up and the abdominal organs like liver, stomach, pancrease, intestines are pushed upward along with the contraction of the abdominal wall. During inhalation the abdominal organs are pushed down along with the relaxation of the abdominal wall. This is done continuously at the rate of 16 to 18 times per minute.

When the tone of the abdominal organs and muscles is reduced the complaints like indigestion, dyspepsia, liver trouble start. The vital abdominal organs do not work efficiently. Under such circumstances massage through selected Yogic practices is very useful.

Various Yogic Practices leading to Massage of the Internal Organs :

1. **Asanas** : These bring in the effects of massage by adequately stretching different muscles of the body. The stretching provides the same stimulus as we do in the massage. It promotes circulation, provides nutrition and improves the efficiency of the organs. Through Asanas we not only deal with the big muscles but also the finer muscles like inter-vertebral and small muscles of the spine. Asanas give stretch to the skeletal muscles as well as smooth muscles of the thoraco-abdominal region. This is done by different movements of the spine such as flexion, extension, lateral flexion and twist.

2. **Pranayama** : Diaphragm is the most important smooth muscle of respiration. With its constant movement during respiration it gives massage to the heart and the organs in the abdominal cavity. The pressure changes taking place due to the movement of the thoracic diaphragm has a pumping action on the organs of the thoraco-abdominal cavity which is respon-

sible for promoting the circulation of the blood. The slow and steady contraction and expansion of lungs during controlled inhalation and exhalation called Puraka and Rechaka promote healthy lungs.

The pressure manipulation in the form of Kumbhaka and application of Bandhas have pronounced effect on nerve stimulation as well as channelisation of bio-electricity.

3. **Bandhas and Mudras** : An important procedure in these is the manipulation of internal pressures on the negative and positive side. Such a manipulation of pressures when used judiciously serves many purposes. It tones up the internal organs, helps to decongest them and stimulates their healthy activity. With the practice of Bandhas and Mudras over a long period one is able to exercise more direct control over the autonomous functions.

These also seem to bring about certain marked changes in endocrinal and electrolyte balance.

Practice of Bandhas and Mudras like Uddiyana, Mula, Jalandhara, Ashwinimudra involve control of semivoluntary muscles in the body like thoracic diaphragm, anal sphincters, pelvic floor, throat etc. which have the integration of central and autonomic nerve supply. By bringing these muscles under volition one could influence thereby the activity of the autonomic nervous system which functions as a whole.

4. **Kriyas** : In many kriyas like Sutra Neti, Danda Dhauti, Vastra Dhauti, Mulashodhana, frictional effect on the internal mucous membrane is caused which may be considered as an internal massage.

This internal massage by causing friction on the internal mucosa reflexly stimulates healthy functioning of the internal organs like stomach, nose, aesophagus, anal canal etc.

Kriyas bring in purification of the entire body and influence the reflex mechanism favourably.

Difference in General Massage and Yogic Massage :

1. The nature of general massage is to improve circulation in the skeletal muscles while Yogic practices help to give massage to the internal vital organs and to the smooth muscles. Because of the deeper massage to the internal organs Yogic practices are in a position to work on and influence circulatory, neural and endocrinal mechanism. This is not expected and attained through general massage.
2. General massage has temporary and short time benefit while yogic massage goes a long way to bring in gradual changes in the psychophysiological mechanism leading to the transformation of the personality.
3. General massage requires the help of a masseur and the person getting massage has to play a passive role. In Yogic massage one has to actively participate in the performance of yogic practices.
4. In yogic massage no extra material like oil, powder etc. is needed as is necersary for general massage.

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Yoga Mimamsa Vol. XXVII, No. 3 & 4, pp. 81 to 91,
October 1988, January 1989.

'Yogic Shatkriyas' and 'Ayurvedic Panchakarmas' : Some Thoughts and Reflections*

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Introduction :

We find references to Ayurvedic terms in Yogic literature and Yogic terms in Ayurvedic literature. Yoga has been included as one of the subjects of study in **'Swastha Vrutta and Sadachar'** by Ayurvedic faculties in many Indian Universities. Likewise people working in the field of Yoga are realising the need of their exposure to Ayurvedic concepts and approaches. Some teachers and physicians of Ayurveda have started talking and writing on the subject of Yoga. In this connection, attempts are being made to equate Ayurvedic **Panchakarmas** with Yogic **Shatkriyas**. Some thoughts and reflections on this subject are expressed here for consideration of the profession.

Yogic Shatkriyas :

The term Shatkriyas usually refers to the six classes of (cleansing !) processes as mentioned in Hathapradipika (II : 22). We find an elaborate description of varieties of techniques in Gheranda Samhita and Satkarmasangraha, The Subject has been very well reviewed by Dr. M. L. Gharote in his article, 'Shodhana kriyas-An analysis'.

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* Article specially prepared for the special issue of Ayurveda & Yoga Journal of All India Ayurvedic Specialist (Post Graduate) Association, West Bengal.

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The six classes of yoga techniques, (hereinafter referred to as 'Kriyas') are summarised below :

1. **Dhauti** : a) Vastra Dhauti
    - b) Gajakarni—popularly known as Vamana dhauti.
    - c) Danda Dhauti—using solid flexible structure like a stem or an aerial root of a Banyan tree.
    - d) Danda Dhauti—using rubber tube as introduced by Swami Kuvalayananda.

    N. B. : Gheranda Samhita has described twelve kinds of Dhautis)

2. **Basti** :

    Vajroli kriya could be considered along with Basti as the same principles are involved in its practice.

3. **Neti** : a) Sutra Neti
    - b) Jala Neti–mentioned as Vyutkrama and Sitkrama type of Kapalabhati by Gheranda Samhita.
    - c) Cathetor Neti–as introduced by Swami Kuvalayananda.

4. **Trataka** :

5. **Nauli** : a) Dakshina (Right)
    - b) Madhya (Central)
    - c) Vama (Left)
    - d) Nauli Chalan (Rotation).

6. **Kapalabhati** : a) Vatkrama–with air
    - b) Vyutkrama } with water
    - c) Sitkrama }

Even though, these techniques are looked upon as purificatory processes by many, the main and ultimate aim is to prepare the individual for self-realisation and final liberation through Samadhi as mentioned in Gheranda Samhita (I; 11)

Ayurvedic Panchakarmas :

This term usually refers to the following fiive kinds of processes mentioned by Charaka Samhita.

1. **Vaman** : (Also termed as **Urdhwa Virechana**)

   Usually understood as vomitting, but it has many more meanings according to Sanskrit grammer and Ayurvedic texts.

2. **Virechana** : a) Anuloman
   - b) Sramsana
   - c) Bhedan
   - d) Rechan

   Usually it is taken as purgation i. e. rechan.

3. **Basti** :

   A) According to the site of the body
   - a) Pakwashayagat Basti
   - b) Uttarabasti for i) Uterus
     ii) Bladder
   - c) Vranagat basti for Ulcers.
     However popularly Basti karma is understood as flushing of the colon.

   B) According to the substances used for Basti Karma
   - a) Niruha where various kinds of decoctions are used.

b) Anuvasan where fatty preparations are used.

C) According to the action or out-come of Basti

a) Shodhan b) Lekhan c) Snehan

d) Brunhan e) Utkleshan f) Shaman

g) Karshan h) Rasayana i) Vajikaran etc.

4. **Nasya** : (Also called as **Shiro–Virechana**).

a) Navan–use of oil (sneha) drops in nose

b) Avapida – using herbal juices

c) Pradhaman or Dhynamapan–using powders

d) Dhuma–use of smokes

e) Marsha-pratimarsha – using oil (sneha) with the help of fingers.

5. **Raktamokshan** : (Blood letting)

a) Through veinesection

b) without veinesection.

The Pancha Karmas (hereinafter referred to as 'Karmas') are employed for three purposes.
viz :

1. By the healthy individual

a) in daily routine

b) according to seasons and

c) to tackle imbalances arising out of suppressed 'Vegas'

2. To accentuate the effect and power of 'rasayana' and

3. To tackle various diseases

Pancha Karmas have three parts as follows :

1. Purva Karma (Preparatory process)
2. Pradhan Karma (Main process) and
3. Paschat karma (after process)

Different ayurvedic texts have mentioned many 'Karmas' for Shodhan i. e. purification. Vaidya Haridas S. Kasture has given a detailed account of Pancha Karmas in his book, 'Ayurvediya Panchakarma Vijnana'.

Trataka Kriya from Yoga and Raktamokshana of Ayurveda are peculiar to those respective disciplines and cannot be compared for any similarities and/or differences. Hence they have been omitted from the discussions to follow hereafter.

Points of similarities between comparable Kriyas and Karmas

1. Both are intended for purification (Shodhan)
2. They are working in the same regions or areas of the body as shown below :
   a) Head, Nose and air passages – Neti, Kapalabhati, Nasya
   b) Oesophagus and stomach – Dhauti, Vaman
   c) Intestines – Nauli, Virechan
   d) Colon – Basti

Points of differences between comparable Yogic Kriyas and Ayurvedic Karmas :

Ayurvedic Karma	Yogic Kriya
1. Mostly administered on patients who may be physically weak and thus unable to perform yogic kriyas.	1. Mostly performed by normal healthy individuals who have strength, vigour and will power.

Ayurvedic karma contd.	**Yogic kriya contd.**
2. Patients could be in conscious, semi-conscious, drowsy or semi-comatose condition and they need not be intelligent.	2. Kriyas require certain kind of intelligence, determination and wakefulness in the practitioner.
3. Some kind of irritating substances are employed in the form of decoctions, powders, pastes, oils or smoke. Thus the main channel of action is through 'irritation'	3. Non-irritating agents like air and water are employed. Cotton thread and cotton strip used for Neti and dhauti respectively can not be called as irritants in the strict sense of the term. The main channel of action is through 'stimulation'.
4. Nurse or physician has to administer Karma.	4. Individual employs Kriyas himself without any attendant or assistance.
5. Mostly work at the reflex level without the involvement of the intellect and will power of the patient. Thus karmas mostly work at the physical level and the lower brain centres.	5. Initially kriyas work on and through the intellect and will power of the person i. e. higher brain centres and afterwards it works on the physical level.
6. Repeated karma does not enable the patient to perform it on one's own. Thus it has no 'Learning effect'. Due to lack of learning karmas fail to act on higher brain centres.	6. After some practice, the person can perform the kriyas efficiently with minimum of stress. Thus there is definite 'Learning effect' involving higher brain centres.

7. Snehan is strongly recommended before each karma and certain treatments are given after the karma is over.	7. There is no concept of snehan in respect of kriyas. However the influence of these kriyas on the practice of Pranayama can be and should be observed.

Comparisons between specific kriyas and karmas

I. **Ayurveda Basti karma**	**Yoga Basti kriya**
1. Usually given for the treatment of constipation or as retention enema for the obsorption of nutrient materials or for local action of the medicines.	1. Usually practised after normal evacuation of bowel for getting sensitised to the internally aroused sensations having a particular directionality.
2. The fluid is introduced under positive pressure inside the colon.	2. Fluid gets sucked due to the creation of negative pressure.
3. The pressure gradient and fluid volume decide the extent of the passage of fluid in the colon, e. g. low or high enema.	3. The intensity of negative pressure change decides the extent of passage of water in the colon e. g. in Uddiyana it will be less and in Nauli it will be more. However more attempts of Uddiyana or Nauli will help the same volume of water to spread over a larger area.

Basti karma from Ayurveda contd.	Basti kriya from Yoga Contd
4. Because of positive pressure, the colon gets distended and thus reflexly contracts and gives rise to evacuation unless and until it is given as a retention enema.	4. Because of negative pressure, the colon does not get distended to a great extent. Thus there is no urgency for evacuation while Uddiyana or Nauli is maintained.

N. B. : Vajroli Kriya of yoga also has the same basis as that of Basti and thus it can be compared with the irrigation techniques of ayurveda for vagina, bladder and uterus)

II. Ayurveda : Vaman	Yoga : Gajakarni and Dhauti
1. Vamau works through vomiting. Thus it represents reflex action working on and through the vomiting centre of the brain.	1. Gajakarni essentially denotes a voluntarily controlled flow of water from stomach. Thus it represents an activity initiated and controlled by the higher cortex.
2. Various substances called as 'Emetics' are used in various forms to induce vomiting of different grade and degree.	2. Initially one does work at the level of the vomiting centre, but gradually switches over to the cortical control of the whole process.
3. Every time, an emetic has to be administered to induce vomitting.	3. After initial work, just by thinking, one can bring out water from the stomach.
4. The main aim is to allow the 'Doshas' to come out of the body.	4. The main aim is to open the channels of pranic activity.

5. There is no provision to stimulate the oesaphagus.	5. Through danda dhauti and vastra dhauti, one works at the level of the oesaphagus also.

III. Ayurveda : Virechana	Yoga : Nauli
1. Some kind of laxative or purgative is used. there is either distension or irritation of the intestinal tract which gives rise to defecation.	1. The intestine are stimulated by the rolling manipulations of the abdominal rectii which give rise to negative pressure changes inside the abdominal cavity.
2. The aim is to allow the impurities to be thrown out of the body through the intestines.	2. The aim seems to stimulate the intestinal track so that sensory inputs can reach the rabin and give rise to a different kind of visceroceptive awareness.

IV. Ayurveda : Nasya	Yoga : Neti and Kapalabhati
1. Some kind of irritants or strong stimulants are employed which essentialiy work on and through the olfactory area. However some agents can work on the naso – pharyngeal mucous membrane.	1. The whole of naso – pharyngeal mucous membrane gets gently stimulated without the irritation of the olfactory area.
2. The naso – pharyngeal mucous membrane is stimulated to throw off impurities from the upper part of the body.	2. The naso-pharyngeal mucous membrane is stimulated and the sensations can be perceived by the subject leading to heightened awarness of this region.

Discussions :

1. Gheranda Samhita, Satkarmasangraha and later yogic texts seem to have treated Shatkriyas on the lines of ayurvedic thinking of Shodhan i. e. purification of the body while the original stand point of prescribing them was to open the channels of pranic activity for better and effective study and practice of pranayama.

2. Because of the change in the original approach to yogic kriyas, now-a-days, mostly, people treat them as purificatory processes on par with or comparable with the ayurvedic panchakarmas.

3. The presentation made so far will convince any one that yogic kriyas can not be and should not be equated and compared with ayurvedic panchakarmas.

4. In the initial stages of teaching, learning and practising of yogic kriyas, one may get results very much similar to those of panchakarmas. However that is just a passing phase of the whole programme and one should not limit oneself at that level only.

5. It will have to be admitted that we do not have many details about yogic kriyas when compared with panchakarmas. Thus there is wide scope for further comparative study and research in respect of yogic kriyas.

6. Hathapradipika has clearly mentioned in Chapt.V, verse 22 to take recourse to medical treatment with the help of a physician, if diseases are present. Thus, [aim of yogic kriyas is definitely different from those of Ayurvedic panchakarmas.

Conclusions :

One should not equate yogic kriyas with ayurvedic pancha karmas as the aims and objectives as well as the mod us-operandi of both is different from each other.

If one fails to appreciate this, then yogic kriyas will be brought down to the level of the panchakarmas.

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GLOSSARY
OF
THE SĀṄKHYAKĀRIKĀ

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Glossary of the Sāṅkhyakārikā

(To indicate cross reference, words are printed in Italic letters. Figures in the brackets refer to Kārikās)

1. *Akartṛbhāva* (19), not being the doer of any action. One of the reasons put forward by I.K. to prove this about *Puruṣa* is that it is a principle of reality which is in every way different from the *Guṅas* and every thing made of *Guṇas*. (K 17).

Every living being is that principle with a *Guṇātmaka* adjunct. This *Puruṣa* principle is said to perform no actions. Nor can we interpret literally I.K.'s statement (K 62) that the *Guṇātma*ka individual called *Liṅga* does everything; because, there is no such thing as *Liṅga* and *Liṅga* alone. Every *Liṅga* is the *Liṅga* of a *Puruṣa.*

Nevertheless, living beings are seen doing this and that. Thus I. K.'s theory is neither *Puruṣa* as such, nor *Liṅga* as such does any thing. It is the *Puruṣa-Liṅga* whole who lives and acts and suffers and enjoys. On attainment of *Kaivalya*, the *Guṇātmaka* component disintegrates. The *Pusuṣa* principle alone survives. This *Puruṣa* neither sees nor feels nor does anything.

While in *Saṁyoga* with a *Liṅga* the dṛṣṭi of the *Puruṣa* part is *Anudṛṣṭi*, his introspect the consciousness of the *Liṅga* part called buddhi doeṣ not see things directly.

But he feels directly. On the other hand, he neither sees what the *Liṅga* does, nor does he do anything directly. This is his Akartṛbhāva. All the same he is responsible for the *Liṅga* working to this end. The *Liṅga* works for his sake without the *Puruṣa* doing anything itself-more or less like the owner of a running car, who does not run himself: nevertheless the car, driven by a driver, runs for taking the owner to his destination.

2. *Aṅkuśa* (51), literally the goad by means of which the mahaut restricts the movements of the elephant.

Here it is used figuratively for those members of the *Pratyaya Sarga* which restrain the progress of another member. That member is *Siddhi* and the three members which hinder its progress are *Viparyaya*, *Aśakti* and *Tuṣṭi*. These are here called the *Trividhāṅkuśa*.

3. *Acetana* (11, 20), devoid of *Cetanā*. Iśvarakṛṣṇa believes that both *Avyakta* and *Vyakta*, including *Liṅga*, are *Acetana*. The *Puruṣa* principle alone is *Caitanya*.

4. *Ajña* (57), one who does not know. Though the mother cow provides milk for the calf, she does not know how and why all this is done. Similarly *Pradhāna* unconsciously provides wherewithal for the *Vimokṣa* (liberation) of *Puruṣa*[1].

5. *Atīndriya* (6), imperceptible. Ordinarily we believe that we perceive. But we also believe that which we cannot perceive of, it is inferred from something which we have perceived.

6. *Adhastāt* (44) downward. *Gamanamadhastāt*, therefore, means going down. Those who live a life of *Adharma* go down in the scale of living creation of which the upper

end is *Brahmā* and the lower end a shrub (K54). The abiding after–effects of committing *Adharma* remain in the *Liṅga* as *Bhāvas* and are here said to degrade the individual called a *Puruṣa*.

7. *Atyanta* (1), completely, once for all. The ordinarily known methods of warding off pain do not root it out from life completely. People suffer inspite of all the scientific achievements of mankind,

8. *Atiśaya* (2), possibility of being excelled. Some methods of gaining freedom from pain prescribed in the Vedas are excelled by others. Hence none of them is undoubtedly the best.

9. *Adṛṣṭa* (30), consciousness of objects of imagination and thoughts-representative consciousness. Such consciousness is preceded by some kind of presentative consciousness of the objects, their parts, or their simple elements.

10. *Adharma* (44), vicious and unrighteous ways of living. See *Adhastāt*. *Adharma* is one of the eight *Bhāvas*. Its cultivation leads to degradation in the scale of living beings.

11. *Adhyayana* (51), reading or reciting of texts relating to Sāṅkhya. It is one of the *Ūhādi Siddhis*, which are quite different from the more popularly known *Aṇimādi Siddhis*. The *Ūhādi Siddhis* are the various marks of the aspirant's success in achieving his goal.

12. *Adhiṣṭhānam* (17), control. *Trīguṇādiviparyayādadhiṣṭhā-nāt*, therefore, means : because there is in every living being a controlling principle which is nothing like the three *Guṇas*. The idea seems to be that we feel that there must be something in each of us which is quite different from our *Guṇātmaka* part and which provides the power of control. This is one of the reasons given by *Iśvarakṛṣṇa* for proving the existence of *Puruṣa*.

13. *Adhyavasāya*[1] (5), knowledge. *Prativiṣayādhyavasāya*, therefore, means sensory perception, which is *Drṣṭā*[2] as explained by *Iśvarakṛṣṇa.*

Adhyavasāya[2] (23), deciding, determining *Buddhi* a san *Antaḥkaraṇa. Buddhi* determinates and arrives at truth. *Ānupakāri* (60), A most beneficial. Although, as a component of every individual *Prakṛti*, provides all the means for the *Bhoga* and *Apavarga* of *Puruṣa*, she gets no return for that as the *Puruṣa* in his turn is not beneficial to her in any way.

15. *Anavasthāna* (7), flagging of attention. See *Manas.*

16. *Anupalabdhi* (8), imperceptibility. *Pradhāna* is not perceived because it is too subtle–not because it is not ere.

17. *Anumāna* (4, 5, 6), inference. It is one of the three *Pramāṇas* and is itself said to be of three kinds. The basis of inference is here said to be the necessary connection between a mark and that of which it is a mark, i. e. the relation of evidence. The three kinds of inference are: *Pūrvavat*, *Śeṣavat* and *Sāmānyatodṛṣṭa.* First of these is inference or an effect from its cause and the second, inference of its cause from an effect. In the third kind of inference, relation of evidence is not based upon a causal connection between the premise and the conclusion. It is based on uncontracted experience of concomitance. Ordinarily the knowledge of that which is not perceived is acquired by inference from that which is perceived.

18. *Antaḥkaraṇa* (33), internal organ of consciousness, which is said to be threefold. Hence the three names: *Manas, Buddhi* and *Ahaṅkāra,* which are said to be three

among the thirteen *Karaṇas* (K32). Work of the external organs lies in the present, but the internal organ takes the past and the future also into consideration. The ten external organs bring to the internal organ knowledge of situation and the impulses to respond to them; and the internal organ deals with these in the light of past experience and future needs.

19. *Andhatāmisra* (48), Complete darkness of the soul, utter spiritual ignorance which is the characteristic of *Tamas* in consciousness. It is one of the five forms of *Viparyaya* and is considered to be that form of *Avidyā* which Patañjali calls *Abhiniveśa*. Taking *Abhiniveśa* to be fear of being deprived of the pleasures which one enjoys, they explain the eighteen forms of Andha.

20. *Apaghāta* (1), preventing, escaping. See *Abhighāta.*

21. *Aprasavadharmi* (11), not producing results. While the *Prakṛti* principle produces effects because of change occurring in it, the *Puruṣa* principle neither changes nor produces any results. It is not the cause of any phenomena.

22. *Abhighāta* (1), striking, smiting. Smitten by the three kinds of pain one looks for the means of escaping these onslaughts.

23. *Abhibhava* (7,12), Overpowering, dominating. It is one of the four ways in which *Sattva*, *Rajas* and *Tamas* are related to one another. When one *Guṇa* dominates over the other two, or any one of them the relation between them would be *Āśraya* of the former which dominates and *Abhibhava* of those which are suppressed. When an object completely dominates over another, it hides the latter which then becomes imperceptible.

24. *Āśraya*[1] (12,16,62), Overpowering, dominance. Different forms and shapes of *Avyakta* are seen because of the dominance of one *Guṇa* over the others in different ways and in different degrees, of which the number is legion.

By *Nanāśrayaprakṛti* I.K. means various forms of prakṛti which appear because of the different *Guṇas* dominating over others in innumerable different proportions.

Āśraya[2] (41), support. *Liṅgas* are *Sukṣma.* Every *Liṅga* exists in and through some *Viśeṣa* or the other. It is in this sense that *Viśeṣas* are the *Āśraya* of *Liṅgas.*

25. *Abhimāna* (24), ego, self. *Ahaṅkāra* is here defined as *Abhimāna*. But obviously the *Ahaṅkāra* which is so defined as the Vaikṛta *Ahaṅkāra* of which the eleven *Indriyas* are differentiations (K25). The entire *Ahaṅkāra*, which in K22 is said to be a differentiation of *Mahad,* should be wider in extent as it includes what in K25 are called *Bhūtādi* and *Taijasa Ahaṅkāras*.

26. *Ayugapatpravṛtti* (18), difference in respect of mental dispositions. Each of us has a system of mental tendencies which are exclusively his or her own. They make up one's mental constitution, or character; and no two characters are exactly the same. This is one of the arguments given by I. K. for proving that there are many *Puruṣas*.

27. *Artha*[1] (12), work, function. The function of the three *Guṇas–Sattva*, *Rajas* and *tamas* are *Prakāśa*, *Pravṛtti* and *Niyama* respectively.

Artha[2] (13, 17, 21, 56. 58, 60), Use, benefit, value, advantage. The objects of the world must be for the use of some one who is not such an object. That entity is *Puruṣa*. This is one of I. K.'s arguments cited for proving the existence of *Puruṣa*.

There is a beginningless *Saṁyoga* of a *Puruṣa* and a *Liṅga*, which proves to be useful for attaining *Jñāna* and Kaivalya, though *Saṁyoga* being *Anādi* was never brought about by anybody for any purpose. This benefit derived from *Saṁyoga* is artha. The knowledge expounded in the *Puruṣas* was imparted by sage Kapila to Āruṇi for the benefit of the *Puruṣa* so that they may get rid of all kinds of pain by attaining *Kaivalya.*

Men and animals work automatically for getting rid of the uneasiness caused by psychological need. Similarly by becoming *Vyakta*, *Avyakta* works automatically for facilitating *Kaivalya* of the *Puruṣas.*

Arthataḥ–therefore means for securing a useful purpose. *Sattva* is responsible for consciousness and subtlety in general, *Rajas* for motivation and movement and *Tamas* for grossness and retaining the after–effects of all kinds of behaviour. But these *Guṇas* work together to form useful wholes.

Artha[3] (31, 42, 65, 69), objective, aim. *Puruṣa* sees *Prakṛti* cleared of her seven *Bhāvas* which have nothing to do with his objective *Kaivalya. Kaivalya* and *Kaivalya* alone is considered by I. K. to be *Puruṣārtha.*

Artha[4] (36), content of consciousness. The eleven *Indriyas* call to consciousness percepts, thoughts and drives which are *Arthas* of *Puruṣa* and present them to *Buddhi*[1].

Artha[5] (72), subjects, contents. All the subjects discussed in *Ṣaṣṭitantra* are undoubtedly the contents of these seventy *Kārikās. Īśvarakṛṣṇa* is only an expounder.

Artha[6] (69), achievement. *Puruṣārtha* is thus the highest achievement of man–the Supreme knowledge or insight–ultimate realisation.

28. *Avagāhate* (35), Enters, gets into, gets involved.

Antaḥkaraṇa goes deep into the percepts and impulses presented to it. Hence it is said to be the responsible organ and the ten *Indriyas* only, the channels, through which these experiences come to it. The *Indriyas* entertain percepts and impulses and pass them to *Antaḥkaraṇa* who dives into them.

29. *Avikṛti* (3), not of the nature of phenomena which are the effects of a material cause. *Mūlaprakṛti* is not itself a phenomenon, though phenomena arise in it. In other words it is in itself a formless reality–*Avyakta*–but many forms arise in it. From this point of view we can say that it is matter and matter alone; though it is not matter as we understand the word matter now, because it displays both that which we call matter and that which we call mind.

30. *Avighāta* (45), freedom from obstacles. This is what one gains or acquires the *Bhāva* which *Īśvarakṛṣṇa* calls *Aiśvarya*. Armed with *Aiśvarya* one succeeds in ones endeavours without meeting unsurmountable obstacles.

31. *Viparyaya Kevala Jñāna*, the highest knowledge. It is pure because of absence of all experiences tainted by *Tama*, *Moha*, *Mahāmoha*, *Tāmisra*, *Andha Tāmisra*. While the five innate motives of these names are covered by *Īśvarkṛṣṇa's* word *Ajñāna* – the opposite of *Jñāna* (K23)–the one word used by him for the responses motivated by them is *Viparyaya* (K46).

32. *Avibhāga* (15), unity. There must be unity behind the diversity in nature. Because otherwise there would be no such uniformity in nature as we find it. This is advanced

as an argument to prove the reality of *Avyakta* which is that one reality.

33. *Aviveki* (11, 14), an entity of which the components are not discrete individuals as are the members of a class. The *Guṇas*, which constitute *Vyakta* work by mixing with one another. None of them has its own separate existence as a discrete individual.

Vyakta cannot be split into *Sattva, Rajas* and *Tamas*. The reason is that wherever we find these three *Guṇas* we do not see discreteness and where are no *Guṇas* there is discreteness. Such absence of discreteness should qualify *Avyakta* also, as an effect has the same qualities as its material cause has.

34. *Aviśuddhi* (2), contamination. The methods of getting rid of pain laid down in the Vedas are also not perfectly clean. Reference may be to the offering of animals etc. in the sacrifices or to the aim of sacrifices, viz. swarga etc. not being highest. The motive with which these rites are performed is enjoyment of some pleasure in future which is not supposed to be the purest motive.

35. *Aviśeṣa* (34, 38), not concrete, abstract, simple, elementary. The cognitive experiences gained through sense organs are of two kinds–abstract and concrete. The former are sensa and the latter percepts. We perceive concrete objects and sense their simple qualities. The former are *Viśeṣa*, the latter *Aviśeṣa*, though both are individual, as opposed to general.

An ancient Indian theory is that there are the same *Tanmātrās*, in the sense organs as are there in their adequate stimuli and this is why certain attributes of objects stimulate certain sense organs and we sense those qualities. There is thus an affinity between the potential energy in the sense organs and the kinetic energy outside. This is why *Tanmātrās* are called *Aviśeṣas*.

36. *Avyakta* (2, 10, 14, 16, 58), literally unmanifest, potential, not actual, unnoticed. It is one of the three realities, a deep insight into which is said to be the means of getting rid of pain which is superior to all other means. *Avyakta* is described as the one everlasting, all pervading, supporting, formless, independent first cause which is not many in one. Though it can neither be perceived nor introspected, its reality is proved by inference from the following: (1) everything has a material cause in which its essence must be present, (2) the differentiation (effects) are limited, (3) unity of nature and (4) all effects emerge from and disappear in their material cause.

Avyakta operates through the three *Guṇas* mixing with one another and assuming different shapes in accordance with the degree of preponderance of each *Guṇa*. As if to satisfy an inner urge of its own *Avyakta* provides all the *Vyakta* means required by any *Puruṣa* for the attainment of *Kaivalya*.

37. *Avyāpi* (10), not purvasive. Though according to Iśvarakṛṣṇa in the *Guṇātmaka* universe is *Mahad*, which is *Āvyāpi* he does not call the *Vyakta* reality to be *Āvyāpi*, presumably because it is of the nature of change and the term *Vyāpi* can apply only to an everlasting substance which underlies change. This substance is Iśvarakṛṣṇa's *Avyakta*.

38. *Asāmānya* (29), not joint. Each *Karaṇa* has a function of its own to perform. This is not a joint function. But there is also a *Sāmānya Karaṇa Vṛtti–Dhārāṇa* which is a joint function. The distinct function of *Karmendriyas*,

Ālocana of Buddhīndriyas and *Sañkalpābhimānādhyavasāya* of *Āntaḥkaraṇa : Praṇa* etc. are the combined action of all the *Karaṇas.*

39. *Aśakti* (46, 47, 49), experience of any of the thirteen *Karṇas* failing to function properly. Such failure is often caused by an originally defective organ injured and damaged part of the body. These diverse experiences form part of the universe of experience called *Pratyaya Sargā. Aśaktis* are said to be twenty-eight in number because there are eleven *Indriyas*, each of which is liable to disorder and failure and there are nine *Tuṣṭis* and eight *Siddhis* each of which can elude the grasp of *Puruṣa.* Inability to succeed in a *Tuṣṭi*, or a *Siddhi* is a *Buddhibādhā* (failure of Buddhi) according to Iśvarakṛṣṇa.

40. *Ahañkāra* (22, 24, 25), individuation. It is *Mahad* seen in its *Sattva*-predominant, *Rajas* predominant and *Tamas* predominant aspects. Hence there are three kinds of *Ahañkāra-Vaikṛta* and *Rajas* and *Bhūtādi.* The first of these is described as *Abhimāna.*

41. *Ākūtahetuka* (31), prompter. Functioning of one *Karaṇa* prompts that of another. The idea is that though the activities of different organs are different, there arises no confusion. Co-ordination is brought about by their being complementary functions. All the *Karaṇas* perform their own specific functions without interfering with the functions of the other *Karaṇas*. Each takes its cue from the others. This is caused by the mother motive.

42. *Ākhyāyikā* (72), story told to bring home to the listener an abstruse theory or a truth. Obviously *Ṣaṣṭitantra*, which is now lost, contained such explanatory illustrative stories. Ī'śvarakṛṣṇa did not repeat them in his seventy *Kārikās.*

43. *Ātyantika* (68), absolute. From īśvarkṛṣṇa's statement that when death ensues and absolute *Kaivalya* is attained it does not follow that he believed in some kind of life which is also *Kaivalya,* though not the *Ātyantika Kaivalya.* Īśvarkṛṣṇa has never said that. He has said (K66–7) only this that *Saṁyoga*, which is just the opposite of *Kaivalya,* may continue for some time after the attainment of true knowledge and that in that condition *Puruṣa* does nothing which would necessitate a life after death. This is not a state of *Kaivalya.* So long as there is *Saṁyoga* there can be no *Kaivalya.* His meaning seems to be only this that *Kaivalya* is necessarily complete and absolute. He has not used the word *Mukti* or *Mokṣa.* Even after attaining *Kevala Jñāna* there is a possibility of the aspirant falling from hat position; but after attaining *Kaivalya* there is no such ossibility. Use of the word *Ubhayam* does not therefore mean that there are two kinds of *Kaivalya*–one interim *Kaivalya* and the other *Ātyantika.* It only emphasises the two characteristics of *Kaivalya.* That a certain pre–*Kaivalya* state may be called *Jīvanmukti* is a different matter.

44. *Ādāna* (28), literally seizing, grasping, which is the principal activity of the hand. But neither does *Pāṇi* in Kārikā 26 stand for hand alone nor does *Ādāna* for taking or grasping. *Ādāna* obviously covers all–over behaviour which is not the function of any other *Karmeṅdriya* and the *Indriya* which is responsible for such behaviour is given the name *Pāṇi.*

45. *Ādhyātmika Tuṣṭi* (50), remaining contented because of a certain conviction and doing nothing further to obtain insight into the three realities. Such *Tuṣṭis* are said to be four in number. They are *Prakṛti, Upādāna, Kāla* and *Bhāgya.*

46. *Ānanda* (28), Sexual enjoyment. It is the work of the *Karmendriya* known as *Upastha*.

47. *Ānuśravika* (2), that of which we have been learning some methods of getting rid of pain are known to people by experience. Others are those which we employ because we have heard that they would deliver us from pain. Vedas are said to be heard by the *Ṛṣis* and certain rites and sacrifices are prescribed in them for attaining *Swarga* etc. But these methods also are not quite clean; nor are they incapable of being excelled; nor else is the promised freedom from pain ever lasting.

48. *Āptāgama=Āptavacana=Āptaśruti* (4, 5, 6,), testimony of a reliable competent authority, which is one of the three *Pramāṇas*, the other two being *Dṛṣṭa* and *Anumāna*. That which is neither perceived, not inferred from what is known is believed on the strength of such testimony.

According to all the six systems of ancient Indian Philosophy testimony of the Vedas can never be unreliable, because these sacred texts were revealed to the *Ṛṣi*s and revelation is nothing like perception or inference which are liable to be mistaken. Some thinkers go even so far as to say that the testimony of the Vedas alone is *Āptāgama*.

49. *Ārambhaḥ* (56), work. The four *Sargas* are the work of *Prakṛti*[1] undertaken by *Prakṛti*[1] ultimately for the benefit of *Puruṣa*[1].

50. *Ālocana* (28), Sensing and perceiving an object–just that object, not that object as belonging to a class of having a continued existence. The function of sense organs alone is sensing qualities, like sound, colour, smell, and that with *Manas* as an *Indriya* it is perceiving objects like thundering

cloud, red rose, stinking drain. To deal with this presented data is the work of *Antaḥkaraṇa.* This is the significance of the qualification *Mātra*.

51. *Āśrita* (10), having its being in something else. *Śānta, Ghora* and *Mūḍha Viśeṣas*, which are the existent *Vyakta*, have their being in *Mahad*.

Hence they are *Āśrita* and *Mahad* with all that it contains has its being in *Avyakta*. This is also *Āśrita.* But *Avākta* is not *Āśrita* in this sense. As opposed to *Avyakta*, *Mahad* and everything in it is a form assumed by something else which is matter in relation to it. *Puruṣa* resembles *Avyakta* in this respect. They are both *Anāśrita*.

52. *Āsuri* (70), name of the disciple to whom this knowledge contained in *Ṣaṣṭitantra* was first imparted by *Kapila*.

53. *Āharaṇa* (32), performing an action. A *Karmendriya* may bring about an action impulsively as soon as the *Manas* perceives a situation; or the sense organs may first present the different sense to the *Antaḥkaraṇas* and the *Karmendriyas*, the impulse to respond to the situation in a particular way; and *Buddhi* may then decide what to do in the light of her objectives and the *Karmendriyas* carry out the action thus chosen. Both these kinds of action are *Āharaṇa*.

54. *Ahārya* (32), that which is done by a *Karmendriya*. A *Karmendriya* may act involuntarily without deliberation or voluntarily after deliberation. In this way behaviour accomplished by the *Karmendriyas* can be said to be of ten kinds–five laukika (of every body) and five divya (of the advanced Yogis).

55. *Indriya* (27), the media through which a material with which *Antaḥkaraṇa* has to deal are called to consciousness. Since there are five sense organs and five action organs, and *Manas* working of them is also said to be an *Indriya*, there are 11 *Indriyas*. The group of sixteen mentioned in Karika 22 consists of these eleven *Indriyas* and the five *Tanmātrās*.

Though the Sanskrit word *Indriya* is some times used in the sense in which the English word 'Organ' is used the *Indriya*s of ancient Indian Philosophy are not parts of the body. They are immaterial and do not die when the body dies. They are abilities of the transmigrating soul and do not exist outside *Liṅgas*,

They are called *Sāttvika* because *Sattva* predominates in their constitution, though *Rajas* also plays a significant part.

56. *Utpatti* (66), appearance, coming into existence. See *Sthityutpattipralaya*.

57. *Utsarga* (28), defecation and micturation–passing stool and water. This ability is called *Pāyu*, which is a *Karmendriya*. *Utsarga* does not include perspiration etc. as these autonomic reflexes are joint functions of all the *Karaṇas*, not functions of the *Karmendriya Pāyu.*

58. *Indriyaghāta* (17), the sensory apparatus being damaged. This is mentioned as one of the causes of imperceptibility of objects though they are there.

59. *Indriyabādhā* (49), the experience of frustration caused by and *Indriya* failing to perform its action. These experiences are said to be of eleven kinds because there are eleven *Indriyas*.

60. *Udāsīna* (20), passive, doing nothing on account of the *Saṁyoga* of *Puruṣa* and *Liṅga*, the former appears to be active though it is in fact *Udāsīna*.

61. *Uparama* (50), detachment, remaining contented with detachment from objects which give pleasure are five of the nine *Tuṣṭis*. They are five because it is in five ways that we desire pleasure from objects i. e. by hearing their sounds, by touching them, seeing them, tasting them and smelling them.

Uparamati (66), feels that her task in done, an attaining *Kevala Jñāna*. *Puruṣa* sees that he is made up of two different entities *Puruṣa* principle and *Liṅga*[1]; and they say that *Puruṣa*[1] realises that he has seen the *Liṅga*[1] and *Liṅga*[1] that has been seen by *Puruṣa*[1] and thus his task is done. Feminine *Anyā* is used because *Liṅga* is *Guṇātmaka* and is here understood to be Prakṛti. *Puruṣa*[1] need not realise anything nor *Liṅga*[1] alone does feel anything. The subject who realises and feels is one. On him dawns the truth that he is two in one.

62. *Upastha* (26), *Indriya* of which the function is sexual enjoyment. It is one of the five *Karmendriyas*.

63. *Upādāna*[1] (9), material cause, the material of which anything is made up. *Upādānagrahaṇa*, therefore, is 'containing the material cause' and the argument *Upādānagrahaṇāt* means because everything has its material cause in it; more correctly, everything is a form of a material, which is called its material cause. This argument is advanced in support of the theory that everything exists potentially in its cause–the well known Sāṅkhya theory *Satkāṛyavāda*. See *Satkārya*.

Upādāna[2] (50), material, here *Mūlaprakṛti.* One of the four *Ābhyantara Tuṣṭis* is called *Upādāna* by I. K. A difference is here made between *Upādāna* and *Viṣayoparama* which is said to be *Bāhya Tuṣṭi.* These two *Tuṣṭis* are remaining contented (1) with some object and (2) with the idea of a *Mūlaprakṛti.*

64. *Upaṣṭambhaka* (13), mover in both senses, viz. motive, and a motion. *Rajas* of which the nature is said to be *Aprīti*, as called *Upaṣṭambhaka.* In fact, appearance of the three *Guṇas* is itself appearance of change and movement which are absent in *Avyakta.* It appears that the difference between the functions of the three *Guṇas* is not made on on the basis of presence or absence of movement but on the basis of visibility of movement. No movement is seen when *Sattva* is predominant, most probably because of the high frequency of change and when *Tamas* predominates, most probably because of the frequency being too low. When *Rajas* predominates movement is apparent because frequency of change is neither too high nor too low. This is why *Rajas* is called *Upaṣṭambhaka.*

65. *Upekṣaka* (66), *Udāsīna.*

66. *Ūrdhva* (44, 54), higher in the scale of lives which runs from *Brahma* to *Stamba.* There is more of *Sattva* in the higher types of life and those who live the life of *Dharma*[1] go up in the scale in their next life.

67. *Ūha* (51), cogitating. Cogitating in search of the highest knowledge is one of the many marks of success in the aspirants endeavour. It is included among the eight *Siddhis.* The eight *Siddhis* are experienced as one advances towards knowledge.

68. *Eka* (66), one of the two, i. e. the *Puruṣa*. When a ***Puruṣa*** attains *Kevala Jñāna*, they say that he ceases to experience pleasure or a pain (see *Upekṣaka* and ***Udāsīna***).

69. *Ekāntataḥ* (1), certainly, undoubtedly. The ordinarily known methods of removing pain are not unfailing. In some cases and under certain circumstances they do not succeed. Hence we cannot say that freedom from pain is undoubtedly gained through them.

70. *Aikāntika* (68), firm, final. See *Ātyantika*.

71. *Aiśvarya* (23, 45), possession of extraordioary powers. If anybody attains any superhuman power, it is not lost with his death as it is not an achievement of the body, though it may be lost otherwise in course of time. The eight *Siddhis–Anima* etc. are generally supposed to be *Aiśvaṛya*. But *Īśvarakṛṣṇa* has not spelled out *Aiśvārya*. He has said only this that acquiring of *Aiśvaryu*, ensures conquest of all obstacles–*Avighātaḥ*. *Aiśyārya* being a matter of *Bhāvas*, it inheres in a *Liṅga*, and so long as it lasts the *Liṅga* transmigrates and its *Aiśvarya* goes with it. It overcomes all the obstacles which come in its way.

72. *Autsukya* (58), uneasiness which is felt when a psychological need arises. (See *Avyakta). Īśvarakṛṣṇa's* theory is that by means of the various *Sargas*[1], which are its *Vyakta* condition, the *Avyakta* impulsively–not voluntarily and deliberately–provides the wherewithal for the attainment of *Puruṣas*.

73. *Karaṇa* (18, 29, 31, 32, 35, 43, 47) the abilities by virtue of which *Liṅga* works, in this sense its organs. But *Karaṇas* are not organs of the body, inspite of the fact that *Liṅga* lives in and works through them. *Liṅga* may in this sense be called *Kāraṇa Śarīra*.

Activity of *Karaṇās* is spontaneous as if they were satisfying a natural impulse. Iśvarakṛṣṇa is a psychological determinist and not a free-willist. At the same time his philosophy is teleological not purely mechanical. According to him *Prakṛti* works in, so that it may bring *Apavarga* to *Puruṣa*. According to I. K. there are thirteen *Karaṇas*, three of which are *Antaḥkaraṇas*, there are eleven *Indriyas*, the number of *Karaṇas* should be fourteen; or the *Manas* working with the *Indriyas* would not be a *Karaṇa*. It would be an *Antarendriya*.

74. *Kartṛtva* (20), performing actions. See *Akartṛbhāva*.

75. *Karmendriya* (26), action organ. There are five action organs according to ancient Indian thinkers. They are, *Vāk*, *Pāṇi*, *Pāda*, *Pāyu* and *Upastha* which are recognised by all schools of Indian Philosophy. The task attributed to them is called *Āharaṇa*.

76. *Kalala* (43), a soft lump, here an embryo soon after fertilization. While the *Liṅgās* transmigrate the *Mātāpitṛja Viśeṣas* developed *Kalalas*–which are the living bodies that do not transmigrate. They are left behind.

77. *Kārya*[1] (32, 43), work, maintenance of life called *Dhārya* is the joint *Kārya* of all the *Karaṇas–Mātāpitṛja Viśeṣas* called *Kalalādyaḥ* depend upon it for their existence and last only so long as life lasts (K 43).

The *Kārya* of the action–organs in general is called *Āharya* and that of the sense organs, the action organs and the *Antaḥkaraṇas*, each working in its own way, is *Prakasyā*. Work of the *Karaṇas* is thus said to be threefold–*Āharaṇa*, *Dhāraṇa* and *Prakāśakara*.

Kārya[2] (8, 14, 15), effect– the form in which a matter which is cause in relation to it exists. *Mahad* etc. are said to be the *Kārya* of *Mūlaprakṛti* and existence of the former is advanced as a proof of the existence of the latter, because every effect is essentially of the nature of its material cause.

An effect can be distinguished from its material cause; but the two can never be separated, as the ring and the gold which is its material cause cannot be separated.

78. *Kāraṇa* (9, 14, 15, 16), material cause. One of the arguments put forward by *Īśvarakṛṣṇa* to prove the theory called *Satkāryavāda* that every effect is potentially present in its material cause and therefore exists in some way even before it appears that the very concept of causation implies this truth.

'Cause and effect' are relative terms. When we think of something, as an effect, it is implied that something, which is its cause must be there that it is already there in a potential state is the theory called *Satkāryavāda*.

The modern scientific view of causation is different. While the ancients thought of a first cause which is not a phenomenon but a noumenon, the modern scientists believe that only a phenomenon can be a cause or an effect. The concept of prime matter has therefore no place in present day scientific thought. All the same the scientist is not quite ignorant of the fact that what he sees as an effect is the transformation of an antecedent phenomenon, which is called its cause. Thus *Satkāryavāda* is not an outmoded ancient theory.

Cause and effect can be distinguished from each other but they cannot be separated.

79. *Kāla* (50), time–here the idea that everything takes time to be accomplished. It is one of the four *Ābhyantara Tuṣṭis*, which consists in remaining contented with the idea that the highest knowledge would come in course of time and thus doing nothing to acquire it.

80. *Kaivalya*[1] (17, 21, 68), literally the state of being unconnected. In *Prakṛti* there is an unconscious urge for separating herself from *Puruṣa*. This shows that besides *Pradhāna*, there is another principle of reality. If there were only one principle of *Puruṣa*[2] there would be no urge for separation.

A *Puruṣa* is neither aware of the final separation of the fact that on its dismemberment its *Guṇātmaka* part would dissolve and only the *Puruṣa* principle would remain.

This part is played by *Pradhāna* which is in *Saṁyoga* with *Puruṣa* working for the separation of the two.

81. *Kaivalya*[2] (19), impossibility of getting mixed up with the *Guṇas* as they do with one another. (See *Puruṣa)* *Saṁyoga* of *Puruṣa* and *Pradhāna* is not like *Mithuna* of *Guṇas*.

82. *Kevala Jñāna* (64), highest knowledge; *Nāsmi Na Me Nāham*. Supreme knowledge dawns upon an aspirant if he realises the truth about reality as explained in the *Kārikās*. This knowledge is said to be pure, because it is free from false notions. See *Aviparyaya*.

83. *Guṇa-Triguṇa* (11, 12, 14, 16, 17, 18, 20, 27, 46), three groups in which patterns of change were arranged by the ancient Indian thinkers. All schools of Indian philosophy speak of them. They are the three big groups in which all the *Vyakta* forms of *Prakṛti* can be placed.

Vyakta is a system of extremely complicated movements, one of its dimensions being frequency of movements and it appears that the ancient Indians thought of three long bands of frequency–a short wave band, a medium wave band and a long wave band–as *Sattva*, *Rajas* and *Tamas* respectively which they called *Triguṇa*. Whether these are electromagnetic waves or only charges of electricity thought of as particles, the explanation in terms of waves is good; because we are all familiar with radio waves. Broadly speaking, consciousness is the form taken by high frequency changes, apparent movement by medium frequency ones and inertia by low frequency changes. Hence they called these the functions of *Sattva*, *Rajas* and *Tamas* respectively. In conscious beings relative preponderance of *Sattva* is peace–tranquility, that of *Rajas* agitation–excitement and that of *Tamas*, dullness, stupidity.

Thus understood, *Sattva*, *Rajas* and *Tamas* are strictly relative terms and in one frequency band itself there are comparatively faster and slower movements. It may be that consciousness of the highest frequencies in the high frequency band is *Prīti*, of the medium frequencies in the same band *Āprīti* and of the lowest frequencies *Viṣāda*.

Complexity of change is another dimension of *Vyakta*. There are movements within movements as there are wheels within wheels in a complicated machinery and there movements may be of vastly varying frequencies. Hence they say that the *Guṇas* all work together. In doing so, sometimes one *Guṇa* dominates over the other two, at other times one is dominated by another or else movement of one frequency changes into that of other frequencies or changes of two or more frequencies blend and produce a single result. This complicated process *Īśvarakṛṣṇa* called *Abhibhava*, *Āśrya*, *Janana* and *Mithuna Vṛtti*s of the *Guṇas* and this mode of action of the *Guṇas* he considered to be responsible for the infinitely large number of forms and shapes which are his *Vyakta*. *Guṇavaiṣamyavimarda* is therefore a good explanation of the diversity found in the *Pratyaya Sarga* and *Guṇapariṇāmaviśeṣa* of the differences among the *Karaṇas*– the thirteen forms assumed by *Buddhi*. We can speak of three *Guṇas* only when *Guṇas* are active. But *Īśvarakṛṣṇa* also believes in another state of *Guṇa* in which state they are not active and since the distinctive characteristics of each *Guṇa* cannot be discerned in that state this state of the *Guṇas* is called *Avyakta*. These ancient investigators thought of the word *Guṇa*, which literally means rope, because their idea was that what they called the *Guṇas* are that quality of *Prakṛti* which binds the *Puruṣa* to it.

84. *Guṇavati* (60), of the nature of three *Guṇas* i. e. *Prakṛti*. *Guṇapariṇāmaviśeṣa* (24), *Guṇas* assuming different forms by combining in different ways. The thirteen *Karaṇas* are such forms taken by the *Guṇa*s. It appears that the first scientist in the world was the ancient Indian investigator-whoever he was–who discovered the three *Guṇas*, their varying stresses and strains and the consequent relativity in nature.

85. *Grāhyabheda* (27), Many different sensa, many different simple impulses and many different wishes all of which *Manas* entertains. Māṭhara reads *Grāhyabhedāt*, *Candrikā* *Bāhyabhedā*t and *Caṇḍapada* and *Vācaspati Bāhyabhedaḥ*. The first is the best.

86. *Catuṣṭaya* (30), The senses, *Manas* as an *Indriya*, *Karmendriyas* and *Antaḥkaraṇa*. In presentative consciousness these may work together at the same time or they may work singly one after the other. In representative consciousness, however, only that which is previously entertained by the *Indriyas* is re-called.

87. *Guru* (13), gross, heavy, slow *Tamoguṇa* which is predominant in the material world is described as *Guru.* It is responsible for the grossness, heaviness and sloth of matter.

88. *Ghora* (38), agitated, here that in which action perdominates. A *Ghora Viśeṣa* is a *Guṇapariṇāmaviśeṣa* in which action and therefore *Rajas* which is responsible for it predominates.

89. *Ghrāṇa* (26), the olfactory sense. See *Indriya.*

90. *Cakṣu* (26), the visual sense. See *Indriya.*

91. *Cala* (13), presenting apparent movement. While *Sattva* and *Tamas* movements are not perceptible *Rajas* movements are. Hence it is called *Cala.* See *Guṇa.*

92. *Cetana* (55), See *Cetanā.*

93. *Cetanā* (20), consciousness. *Prakṛti* is utterly devoid of this consciousness. *Puruṣa* alone is *Cetana.* It is a principle essentially different from *Prakṛti,* though there is a beginningless connection between the two. The consciousness of the *Puruṣa* principle is nothing like own consciousness, which is a *Vṛtti. Puruṣa Cetanā* is not a *Vṛtti* in any sense.

All the same it appears that *Liṅga* itself is conscious.

94. *Janana* (12), rising, springing. It is one of the ways in which the works of the different *Guṇas* are related to one another; e. g. *Aprīti* may result from *Prīti, Viṣāda* from *Aprīti,* and so on. (See *Abhibhava* and *Āśraya*[3]*).*

95. *Jña* (2), the *Puruṣa* principle, one of the three realities, a deep insight into which is the best and the most perfect means of getting rid of pain–*Duḥkhatraya.* Nothing more can be said about this principle.

96. *Jñāna*[1] (23, 44, 64) Supreme realisation = *Nāsminamenāham* as a *Bhāva*, which an aspirant develops in course of time and which brings *Apavarga* to him. *Īśvarakṛṣṇa* posits a causal connection between *Jñāna* and *Apavarga*; but since, according to him *Rāga* perpetuates *Saṁsāra*, *Virāga* is also necessary for gaining *Apavarga*.

Jñāna[2] (69), systematic knowledge which an aspirant obtains by perception, inference or testimony. The knowledge contained in the Kārikās was imparted by the sage Kapila to Āsuri for the benefit of us *Puruṣas*. This was revealed to the sage Kapila, but to the students and the persons desirous of obataining release from suffering it is now available in I. K's Sāṁkhya Kārikās. (See *Āsuri)*.

97. *Tattvābhyāsa* (64), repeatedly calling to mind all the principles which constitute reality, particularly the *Puruṣa* principle as clearly distinct from the *Guṇātmaka* principle. (See *Vikāraḥ)*.

98. *Tanmātrā* (24, 25, 38), the matter of which the *Bhūtas* are said to be forms, the imperceptible matter of the perceptible material existence, literally that and that alone. But form and matter are relative terms; the *Tanmātrās*– *Śabda*, *Sparśa*, *Rūpa*, *Rasa* and *Gandha* are themselves forms of *Bhūtādi Ahaṅkāra* which is matter in relation to them. *Tamas* predominates in *Bhūtādi* and therefore in the *Tanmātrās* and the *Bhūtas*. They are all matter in the sense in which we understand this word to–day.

But the material objects as they exist and are perceived by us are the *Mūḍha Viśeṣas* – the *Prabhūtas*. All the other conditions of matter are abstractions for lay men. It is the scientist or the metaphysician who knows about them in his own way. As for example, we can perceive and deal with gold in this form or that-a ring, a coin or a crown. The chemist, on the other hand, does not deal with these things. For him they are all gold, and the metaphysician in search of ultimate reality sees all these objects as the *Mahābhūta Pṛthvī*, which is made up of the *Tanmātrās* which in their turn, are forms of *Bhūtādi Ahaṅkāra* a differentiation in *Mahad*.

99. *Tamas*[1] (13, 54), that among the three *Guṇas* which is described as gross, slow, heavy and restraining, i. e. causing obstruction. Preponderance of *Tamas* obstructs *Sattva* and *Rajas*. Consciousness is a *Sāttvika* phenomenon in the sense that it appears where *Sattva* predominates. But if the *Tamas* part in it raises its head dullness and stupidity characterise consciousness. Hence *Tamas* is described as *Viṣādātmaka* (Kārikā 12). *Tamas* predominates in the lower rung of the *Bhautika Sarga*, in *Tanmātrā* and in *Adharma*, *Ajñāna*, *Rāga* and *Anaiśvarya*.

Tamas[2] (48), that variety of *Viparyaya* in which the intensity of *Tamas* is comparatively the lowest. It is higher and higher in *Moha*, *Mahā-Moha*, *Tāmisra* and *Andha Tāmisra* in this order. *Tamas* itself is said to be eightfold.

The commentators equate it with Patañjali's *Avidyā*.

100. *Tāmisra* (48), a variety of *Viparyaya*. (See *Tamas*)[2] It is itself said to be eighteenfold. Commentators equate it with *Dveṣa*, which is described by Patañjali as the attitude adopted towards those persons, things and situations that cause pain.

101. *Tairyak* (53), one of the three forms of life – the lowest which includes the animal and vegetable kingdoms. The five subdivisions of this kind of life are : *Paśu, Mṛga, Pakṣi, Sarisṛpa* and *Sthāvara* lives.

It is difficult to distinguish between the first two. But since domestic animals are not generally considered to be *Mṛgas* it appears that *Paśus* are domestic animals and *Mṛgas* wild beasts. In general plants and trees are innumerable. *Sthāvara* probably stand for the entire vegetable kingdom. (See *Daiva*).

102. *Tuṣṭi* (46, 47, 49, 50), satisfaction, contentment–here premature satisfaction, which is one of the experiences that constitute the *Pratyaya Sarga.* They speak of nine *Tuṣṭis*, four of which are *Ādhyātmika* and five *Ādhibhautika*, i. e. having to do with objects of pleasure.

103. *Taijasāhaṅkāra* (25), one of the three forms of *Ahaṅkāra*–that form which is supposed to be the source of energy. As movement is considered to be the function of *Rajas*, *Taijasāhaṅkāra* is *Rājasikāhaṅkāra* which plays a minor part in both *Indriyas*, in which *Sattva* predominates and *Tanmātrās*, in which *Tamas* predominates.

104. *Traya* (1, 29, 30, 33, 51), In K1 and 51 it means three in number; in 29 and 30 it stands for sense organs, *Manas* working as *Indriya* and action organs. These three work jointly as well as severally. The five *Vāyus* are their joint function, known in one word as *Dhāraṇa.* In presentative consciousness these three may work simultaneously with *Antaḥkaraṇa* or before *Antaḥkaraṇa* comes into play. In representative consciousness, however, *Antaḥkaraṇa* avails of the work of these three done previously. In K33 the word three is used for the *Antaḥkaraṇas–Manas*, *Buddhi* and *Ahaṅkāra*. See *Antaḥkaraṇa.*

105. *Triguṇa* (11, 16, 17, 18), (See *Guṇa)*

106. *Traiguṇya* (14, 18).)See *Guṇa)*.

107. *Tvak* (26), the cutaneous sense. (See *Indriya).*

108. *Darśana* (21), seeing–here a *Puruṣa* seeing the difference between the *Puruṣa* and *Prakṛti* principles clearly and unmistakably. This insight is, in *Īśvarakṛṣṇa's* words *Darśana* of *Prakṛti* by *Puruṣa*. His meaning seems to be that *Puruṣa*[2] comes to know that he is a composite individual of which the permanent constituent is *Puruṣa* and impermanent *Prakṛti*. By *Pradhāna* in this kārikā I. K. means *Pradhāna* in the forms of *Liṅga*. *Kaivalya* follows *Darśana*. The former is *Puruṣa* being left unencumbered by *Prakṛti*.

109. *Dāna* (51), purification–here purity of *Kevala Jnana*. *Dāna* is considered to be a *Siddhi* by *Īśvarakṛṣṇa*-the highest one because it is free from *Viparyaya*. Absence of *Dveṣa* which is *Viparyaya* is purity of heart. It is *Dāna* in this sense.

110. *Dṛṣṭa*[1] (1, 2), ordinarily known. Since ordinarily known means of getting rid of pain do not end pain absolutely and permanently, a search for other means is necessary.

Dṛṣṭa[2] (4, 5, 6, 30), perception, including delayed discernment of a percept perception, inference and testimony are said to be the three *Pramāṇas*--sources of belief knowledge gained through the sense organs in *Dṛṣṭa*, which is presentative cognition as opposed to representative cognition, thinking and remembering. The latter is therefore adṛṣṭa in this sense. It is always preceded by *Dṛṣṭa*.

Dṛṣṭaḥ (43), are found, seen, exist. The *Bhāvās* inhere in *Liṅ ga*[1], which is made up of the *Karaṇas*. The fertilised ovum is in the mother's womb.

111. *Duḥkha-Traya* (1), *Ādhyātmika*, *Ādhibhautika* and *Ādhidaivika* pain. The first of these is due to disease and anxiety; the second is caused by other living beings; and

the third sent by supernatural agencies e. g. earthquakes, storms. Life is full of these and thoughtful persons search for means of escaping them.

112. *Duḥkha Vighātastraya* (5), esacaping the *Duḥkhatraya*. This makes up three of the eight *Siddhis* mentioned by *Īśvarakṛṣṇa* obviously this is relief obtained by ordinary means; because the relief obtained by *Kevala Jñāna* is *Apavarga* itself.

113. *Daiva* (53), in a sense the higher type of life made available by *Pradhāna* to *Puruṣas*. Though *Antaḥkaraṇa* is most highly developed in the *Devas*, the ancient Hindus believed that *Kaivalya* can be attained only by existing in human life.

They speak of eight types of *Devas* who are said to be *Brahma*, *Prajāpati*, *Indra*, *Pitṛ*, *Gandharva*, *Yakṣa*, *Rākṣasa* and *Piśāca*. Thus *Deva* in this context does not mean what we understand by the English word God. *Deva*, *Tiryak* and *Manuṣya* are the three broad divisions of what *Īśvarakṛṣṇa* calls *Bhautika Sarga*–the long range of lives–*Deva* being a superhuman and *Tiryak* subhuman.

114. *Drastṛtva* (19), being a seer, seeing. According to Patañjali *Puruṣa* sees *Citta* and this is the only part which it plays. See *Akartṛbhāva*.

115. *Dvārāṇi* (35), media through which something is obtained. The *Bāhyendriyas* call percepts and impulses to consciousness and present them to *Antaḥkaraṇa*. They are therefore called *Dvārāṇi*.

116. *Dvārin* (35), one who receives something through some other agency. *Trividha Antaḥkaraṇa* receives percepts and impulses through the eleven *Indriyas*. It is therefore called *Dvārī*.

117. *Dharma*^{1} (44), meritorious actions like charity and sacrifice. By living a life of *Dharma* the aspirant rises in the scale of living beings– *Bhautika Sarga.* See *Ũrdhva.*

Dharma^2 (23, 43), the dispositions formed by practising *Dharma*^{1}. *Dharma*^{2} and *Adharma* in this senses are counted by *Īśvarakṛṣṇa* among the *Bhāvas*, which inhere in *Liṅga* and thus remain with it as it goes from one life to another.

118. *Dhāraṇa* (32, 67), maintaining life by means of autonomic reflexes like respiration, digestion, incubation. See *Vāyavāḥ. Dhāraṇa* is said to be the joint function of all the *Karaṇas.*

119. *Dhārya* (32), the work which is accomplished by *Dhāraṇa.* It is maintenance of life in a living being and can be said to be tenfold because it is accomplished by means of the five prāṇādi and five *Nāgādi Vāyavāḥ.*

120. *Naṭa* (42), actor, *Liṅga* is said to be like an actor who plays different roles in different dramas one after the ther. Innumerable such roles – the *Bhautika Sarga* – are provided by *Prakṛti.*

121. *Nimitta Naimittika Prasaṅga* (42), the law of *Karmavipāka.* According to *Īśvarakṛṣṇa* rise and fall in the scale of lives is determined by *Dharma* and *Adharma* respectively. Here *Dharma* and *Adharma* are *Nimitta* and the lives got as a consequence of perpetuating them their *Naimittikas.* Not only *Dharma* and *Adharma*, but all the *Bhāvas*, i. e. the psychological makeup of *Liṅga*, determine its future. *Jñānā*, *Ajñāna*, *Rāga*, *Vairāgya*, *Aiśvarya* and *Anāiśvarya* are in this way all *Nimittas* and *Apavarga*, *Bandha*, *Prakṛtilayatva*, *Saṁsāra*, *Avighāta* and *Vighāta* all their respective

Naimittikas. It is in this *Nimitta–Naimittika* framework that *Liṅga* moves from life to life. Patañjali has distinguished between the laws of *Karmavipāka* and *Karmaphala,* the latter bringing only pleasure and pain.

122. *Niyata* (39, 40), lasting. A living being is *Puruṣa* embodied in a *Mātā–Pitṛja.* The former, in its turn, is a *Saṁyoga* of a *Puruṣa* and a *Sukṣma Viśeṣa.* When a death occurs out of these four it is only the *Mātāpitṛja* which dies. The *Liṅga* continues to exist. It gets dissolved when, following the attainment of *Kevala Jñāna,* the *Puruṣa* attains *Kaivalya.*

123. *Niyama*[1] (12), inertia. *Tamas* itself being motion of low frequency, in combination with *Sattva* and *Rajas* it retards their movement.

Niyama[2] (18), pattern, arrangement. The pattern of birth, psychical make–up and death in every individual is different from every other.

This is adduced as an argument in favour of plurality of *Puruṣas.* But this argument establishes plurality of individual *Puruṣas,* not of *Puruṣa* principle, which is neither born, nor has it any constitution or structure, nor does it ever die.

124. *Nirāśrayam* (41), without any individuality, material or immaterial. If there were no *Sukṣma Viśeṣas,* there would be nothing which would make one *Liṅga* distinct and separate from every other *Liṅga*; and if there were no *Mātāpitṛjas* and *Prabhūtas* there would be no bodies for *Liṅgas*[1] to appropriate and live in.

125. *Nirupabhoga* (40) without deriving pleasure or pain. All the experiences, including pleasure and pain are of *Puruṣas* the composite individual who transmigrates their

experiences cannot be ascribed to *Liṅga* alone. Since the Sāṅkhya thinkers fight shy of talking of transmigration in the connection of principle *Puruṣa*. Therefore they hold that *Liṅga* alone transmigrates, which without its *Puruṣa* remains *Nirupabhoga*.

It appears that neither a *Puruṣa* alone nor a *Liṅga* alone nor a body alone can have any knowledge or do anything. I. K. unambiguously lays down that *Jarā–Maraṇa-Duḥkha* is felt by the *Cetana Puruṣa*. *Jarāmaraṇa* are of the body of a *Liṅga-Puruṣa* who lives a life. Without the adoption of a body by that individual experience of *Jarā-Maraṇa–Duḥkha* is not possible. Similarly a *Liṅga* cannot do anything without the instrumentality of body. A dead body, of course, can neither know nor feel nor act. Hence it would not be wrong to say that *Puruṣa* is not the *Kartā*, that the *Liṅga* transmigrates without feeling pleasure or pain and that the body is not the knower. It is the composite individual, having these three constituents that knows, feels, wishes, desires and acts.

That *Liṅga* alone transmigrates is erroneous thinking; as according to the Sāṅkhya theory *Liṅga* is always the *Liṅga* of a *Puruṣa*. A *Liṅga* and *Liṅga* alone is an impossibility.

126. *Nirvṛtti* (52), self–expression by prompting corresponding behaviour. *Bhāvas* inhere in *Liṅga*, and it is from the *Liṅga* that they operate and determine behaviour. Prompting of behaviour is the satisfaction of *Bhāvas* and this is not possible without a *Liṅga*, as *Bhāvas* exist only in a *Liṅga*.

127. *Nivṛttaprasava* (65), one who has to contribute nothing more. When a *Puruṣa* attains *Kevala Jñāna*, *Prakṛti* has

nothing more to do and therefore makes no new contribution Then the *Puruṣa* sees this sterile *Prakṛti* distinctly as something other than the own *Puruṣa* principle. This in *Īśvarakṛṣṇa's* word, is *Puruṣa* seeing the *Nivṛtta Prasava Prakṛti.*

128. *Pañcaśikhā* (70), the teacher whom *Āsuri* gave the knowledge which he, in his turn, got from Kapila, the founder of the Sāṅkhya system of Philosophy. *Pāñcaśikha* taught this lore to many aspirants.

129. *Paratantra* (10), dependent on another. *Vyakta* depends for its very being on *Avyakta.* It exists in this or that form capable of being introspected or perceived. All these forms make up the *Vyakta* reality.

130. *Paramarṣi* (69), the sage Kapila who is recognised on all hands as the founder of the Sāṅkhya system of philosophy.

131. *Paravāda* (72), other theories. All that was said in *Ṣaṣṭitantra* has been said in the seventy Kārikās with the exception of explanatory illustrations and mention of other theories. See *Ākhyāyikā.*

132. *Pariṇāmataḥ* (16), by assuming different forms *Avyakta* operates by assuming innumerable ever changing forms and shapes as a result of the combination of the three *Guṇa*s in different proportions.

133. *Parimāṇa* (15), limited in space and time. All the various shapes and forms are limited and finite. This is said by *Īśvarakṛṣṇa* to be a proof of the reality of something which is infinite and can therefore take an infinite number of finite forms and shapes. That one reality is *Avyakta.*

134. *Parokṣa* (6), that which can neither be perceived nor introspected. Knowledge of such objects not gained by inference is gained by testimony–*Àptāgama.*

135. *Pāda* (26), the *Indriya* responsible for the ability to move about. It is a *Karmendriya.* Ordinarily we use our legs for moving from one place to another. But those who have no legs also manage to move about. They use the Indriya called *Pāda.*

136. *Pāṇi* (26), the *Indriya* which enables living beings to do something with their bodies without moving from one place to another. Generally we work with our hands. But we can also use the other parts of the body to accomplish a task, e. g. heading a football, unravelling a knot with the teeth, pushing with the trunk. See *Ādāna. Pāṇi* is one of the five *Karmendriyas.*

137. *Pāyu* (26), the *Indriya* which enables us to pass urine and stool. It is a *Karmendriya.* See *Utsarga.*

138. *Puruṣa*[1]=*Pumān* (3, 11, 17, 18, 19, 21, 36, 37, 55, 59, 60, 61, 65), *Jña*, the *Puruṣa* principle of reality which is in every way different from the *Prakṛti* principle. In other words it is not *Guṇātmaka* as *Prakṛti* is. *Guṇas* have an objective reality. *Puruṣas* are not objectively real. They enjoy a reality of their own. Every *Puruṣa* is said to be of the nature of *Cetana.* This principle of reality is not the material cause of any effect. Hence it is said to be *Aprasavadharmī.* From the fact that *Puruṣas* not being *Guṇātmaka,* I. K. infers their *Sākṣitva, Kaivalya, Mādhyasthya, Draṣṭṛtva,* and *Akartṛbhāva.* But *Puruṣa* who is *Cetana* itself, does not suffer. The person who suffers is *Puruṣa*[2] a combination of *Puruṣa* and *Liṅga* and as such devoid of *Cetana. Īśvarakṛṣṇa*

here calls him *Cetana* because he has in him the entity called *Puruṣa.* This thinker fails to distinguish between the whole and the part.

*Puruṣa*² (18, 36, 37, 55, 59, 61, 65), a *Puruṣa* in Saṁyoga with a *Liṅga.* By virtue of their *Saṁyoga* with *Puruṣas,* the *Liṅgas* appear themselves as *Cetana.*

As opposed to that the *Puruṣa* who is not in *Saṁyoga* with a *Liṅga* does not suffer in any way.

On attaining *Kaivalya* the *Liṅga* of the *Puruṣa* which he illumined disintegrates; but the *Puruṣa* does not change in any manner whatsoever. Though they remain in *Saṁyoga* with their *Liṅgas*², while they grow and their bodies die and are born, no change seen in the *Puruṣas.* They remain ever the same. *Saṁyoga* of a *Puruṣa* and a *Liṅgā* is a unique arrangement. It cannot be compared to any combination, mixture or blending we know of. All the same a *Puruṣa* and a *Liṅga* together make up one individual; and during the course of a life in a body they appear to be very much like a *Tridaṇḍa.* The three together behave, suffer, enjoy and transmigrate. The *Puruṣas* themselves do not move. Only the bodies driven by the *Liṅgas* move and the *Liṅgas* in *Saṁyoga* with their *Puruṣas* transmigrate. In absence of *Saṁyoga* there would be neither *Liṅgas,* nor the *Karaṇas,* nor *Mātāpitṛjas.*

139. *Prakāśa* (12), consciousness, which is the contribution of *Sattva* in a living being. See *Guṇa.* The thirteen *Karaṇas* are responsible for thirteen different kinds of consciousness, five sensations, five simple conations; concrete perceptions and conations and various wishes and desires; self consciousness; and taking decisions. *Prakāśakaram* is the process of becoming conscious.

140. *Prakāśya*[1] (32), consciousness, which is the product of *Prakāśakaram*. It is the work of the sense and active organs and the *Antaḥkaraṇas*. It can be either immediate or delayed auditory, tactual, visual, gustatory or olfactory knowledge and may this be considered to be tenfold. *Buddhi* considers the situations perceived as well as considers the pros and cons of the actions imagined by *Manas*.

Prakāśya[2] (36), after becoming conscious of. The other twelve *Karaṇas* bring to consciousness all that is required by *Puruṣa*[2] and present it to *Buddhi* to deal with. To distinguish it from *Prakāśakaram* we can paraphrase it as *Prakāśitum Kṛtvā*.

141. *Prakṛti*[1]- (3, 8, 11. 22, 37, 56, 61, 62, 63), *Pradhāna*,a principle of reality other than *Puruṣa*. As *Avyakta* is so subtle that it is below the threshold for any kind of sensation or introspection and the effects from which its existence is inferred differ from it in as much as they are of the nature of change. They resemble *Avyakta* in being *Guṇātmaka* in enjoying an objective reality capable of being ordinarily understood in being devoid of *Cetana* and in being productive of effects. Innumerable patterns can be discriminated in these movements and innumerable things can be seen. If we look at these only as change, ignoring all their complexity, we call them *Mahad*. This is the ancient Indian terminology. Hence *Īśvarakṛṣṇa's* statement from *Prakṛti Mahān*. When change occurs in *Prakṛti*, it displays in infinity of patterns. This is called its *Vibhutva*. But behind every change is *Prakṛti*, which is its cause and its essence. The various *Liṅgas*, are called by I. K. *Nānāśraya Prakṛti*. The *Liṅgas* are *Liṅgas* because they are in *Saṁyoga* with the *Puruṣa* principle. The theory forms the individual *Puruṣas* and are said to be in bondage and in the end to be released from bondage to transmigrate so long as they remain the *Liṅgas* of *Puruṣas*.

When a *Puruṣa* attains *Kevala Jñāna*, only one out of the eight *Bhāvas* remains in *Buddhi*. Then the *Puruṣa* neither performs meritorious or vicious actions, nor else does he need *Aiśvarya* or suffer in any way by the lack of it. This condition of *Prakṛti* in action is what I. K. calls *Nivṛttaprasava Prakṛti*. If we get rid of the obsession of two phases of *Guṇātmaka* reality, viz. *Sṛṣṭi* and *Pralaya* then there would be no necessity for positing *Prakṛti*. The change would be the last and ultimate *Guṇātmaka* reality. We need not ask what is that which changes. I. K. believes in such a *Pralaya* and hence in *Prakṛti* in which *Guṇas* are not functioning, though in essence it is *Guṇātmaka*.

*Prakṛti*² (3), material cause of something which would be its effects. *Prakṛti* is in this sense the root cause of every thing and though *Mahad*, *Ahaṅkāra*, *Indriyas* and the five *Tanmātrās* are in fact such effects, all of them can be correctly thought of as *Prakṛtis* as well- *Mahad* appearing as *Ahaṅkāra*, which in its *Vaikṛta* form the material of *Indriyas* and in its *Bhūtādi* form that of *Tanmātrās*. *Īśvarakṛṣṇa* calls seven of these forms *Prakṛti Vikṛtis*. But the eleven *Indriyas* and the five *Bhūtas*, the five gross forms, which appear as a result of combination of the *Tanmātrās*– are spoken of by him as *Vikāras*.

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*Prakṛti*³ (50), the *Tuṣṭi* which consists in depending on nature and remaining contented without doing anything to attain *Kevala Jñāna*. This is the name given to one of the four *Ādhyātmika Tuṣṭis*.

142. *Prakṛtilaya* (45), remaining concealed in some *Prabhūta* some atom of matter. Perfect *Vairāgya* without *Kevala Jñāna* enables a *Puruṣa*² to remain so concealed for thousands of years and thus escape the pain of *Saṁsāra*. But this is not

getting rid of pain once for all. These *Puruṣas*[2] have to return to a human existence for attaining *Kaivalya* by *Kevala Jñāna*. This is the ancient Indian view.

143. *Pratiniyama* (18), See *Niyama*.

144. *Pradīpakalpaḥ* (13, 36),*Pradīpavat*–like a lamp. Just as oil, a container, a wick, and a flame are brought together in such a way that a light is produced, lasts for some time and illumines objects, in the same way the three *Guṇa*s combine in such a manner that they prove useful for *Puruṣas*. The eleven *Indriyas* also, each being different from the others like oil, container and wick, perform the one function of bringing to consciousness all that may be required by *Puruṣa*[2] and presenting it to *Buddhi* through *Manas* and *Antaḥ*kāraṇa; though each does it in its own way. They co-operate without blending like the *Guṇas*.

145. *Pratyaya Sarga* (46), the eight different trends taken by the transmigrating souls as determined by the development of different *Bhāvas* the trend towards rising in the scale of living beings by developing *Dharma* and so on. From another point of view they can be placed in four broad divisions called *Viparyaya*, *Àsakti*, *Tuṣṭi* and *Siddhi* which are subdivided to form as many as fifty kinds of different experience. And there are innumerable varieties of each kind of experience. All this diversity is caused by the three *Guṇas* mixing in different proportions. Although experience is a predominantly *Sāttvika* affair, *Rajas* and *Tamas* also play their part in it and three together produce a variety of *Sāttvika* phenomena, which can themselves be arranged in a *Sāttvikatāmasa* scale. These experiences are marks of success and failure in the long course of progress towards the attainment of *Kevala Jñāna*. They constitute what *Īśvarakṛṣṇa* calls the *Pratyayasarga*.

146. *Pratyupabhoga* (32), experience. The *Karaṇas* which give us the various experiences are ultimately the forms taken by *Buddhi.* I. K. therefore considers all *Pratyupabhoga* to be the work of *Buddhi.*

147. *Pradhāna* (11, 37, 38), *Prakṛti*¹. In K. 21, *Pradhāna* is *Pradhāna* in the form of a *Liṅga.*

148. *'Prabhūta* (39), material objects from the microscopically small particles of matter to the biggest masses like the earth.

149. *Pramāṇa* (4), source of belief. We believe what we ourselves perceive or infer or learn from reliable testimony. Hence perception, inference end testimony are called *Pramāṇas* technically known as *Dṛṣta*, *Anumāna* and *Āpatāgama.* We act according to our belief, though they sometimes prove to be wrong knowledge gained by these *Pramāṇas* is not necessarily correct knowledge. But ordinarily these three are the only methods of gaining correct knowledge. Hence this classification of *Pramāṇas.* If knowledge gained by one *Pramāṇa* contradicts that gained by another, we do not work on the assumption that any of them is correct.

150. *Prameya* (4). that which is believed (See Pramāṇa).

151. *Pravṛtti*¹ (12), apparent movement. The extreme *Sattva* movement are too fast and the extreme *Tamas* ones too slow to be noticed. The *Rajas* movements are of intermediate frequency. Hence the work of *Rajas* is said to be movement *Cala.*

*Pravṛtti*² (15), actual existence, happening, appearing. The innumerable particular existents would not be there if there was nothing corresponding to them as their potentialtiy *Śakti*—which becomes actual. This is advanced by

Īśvarakṛṣṇa as one of the proofs of the reality of *Prakṛti*[1], which is the potentiality of every thing that actually exists.

Pravṛtti[3] (17, 57), urge, propensity. There is an inner urge in every *Puruṣa*[2] to do this and that which ultimately proves to be in his interest. Reference is to the search for the surest means of getting rid of pain. That means is *Kevala Jñāna* which brings *Kaivalya*. This urge *Īśvarakṛṣṇa* attributes to *Pradhāna* only. The meaning is that it is by virtue of this component that *Puruṣa*[2] is equipped with this urge. The presence of this urge in every *Puruṣa*[2] is also an argument given by *Īśvarakṛṣṇa* in support of the thesis that there are individual *Puruṣa*[1].

152. *Pralaya* (69), going out of existence. The philosophy taught by Kapila is an investigation into appearance, continuance and disappearance of all that exists.

153. *Prāṇa* (29), the respiratory reflex. It is considered by the ancient Indian thinkers to be one of the five principal *Vāyus*, the other four being *Apāna*, *Samāna*, *Vyāna* and *Udāna*. These are considered by *Īśvarakṛṣṇa* to be the joint function of all the *Karaṇas* which is responsible for maintaining life. If respiration, elimination digestion, circulation and the reflexes to escape injury cease, life ceases. See *Dhāraṇa*.

154. *Prīti* (12), peace of mind. In consciousness, which is predominantly *Sattvika*, concentration of *Sattva* means peace. See *Guṇa* and *Aprīti*.

154. *Prekṣaka* (65), unconcerned spectator. As a result of *Kevala Jñāna*, *Puruṣa*[3] stands like an unconcerned spectator of *Prakṛti*. Then in his *Buddhi* inheres only one of the eight *Bhāvas*, and has *Prakṛti* has no longer to contribute anything for bringing *Kaivalya* to that *Puruṣa*.

156. *Bandha* (44), continuance of *Saṁyoga*. *Saṁyoga* is not broken so long as *Kevala Jñāna* does not dawn on the aspirant. Transmigration may stop for a long time if complete *Vairāgya* is attained without *Jñāna* but *Saṁyoga* continues.

157. *Buddhi* (23, 35, 49), deciding, selecting, determining, discriminating. This is how I. K. explains Buddhi. But at the same time he calls Buddhi a *Karaṇa* which according to I. K. sees the subtle distinction between the *Puruṣa* and *Prakṛti* principles also; and he holds that the *Bhāvas* are the forms which it takes. *Bhāvas*, again, are said by him to inhere, in a *Liṅga* and to transmigrate with it. All this makes a neat consistent theory; *Liṅga* contains *Buddhi* as it is one of the *Karaṇas*, of all of which the *Liṅga* is made up and *Bhāvas* are nothing but the various forms of *Buddhi*. Lay men seek a clear cut distinction between a substance and its functions. But this distinction is superficial and only pragmatic. Science and philosophy speak a different language and the ancient Indian thinkers often ignored this distinction. According to them as *Antaḥkaraṇa* and a constituent of a *Liṅga*[1], *Buddhi* is a substance; as *Adhyavasāya* it is a function and as the *Bhāvas* it is of the nature of dispositions,abilities, disabilitities and so on. Since the *Indriyas* are the forms discerned in *Vaikṛta*-cum-*Rājasa Ahaṅkāra*, it appears that, according to *Īśvarakṛṣṇa*, *Buddhi* is the *Sāttvikarājasa* aspect of *Mahad*. Perhaps it is for this reason that *Buddhi* is some times used as a synonym for *Mahad*.

158. *Buddhīndriya* (26, 34), sense organ. (See *Indriya* and *Karaṇa*) There are five senses–*Cakṣu*, *Śrotra*, *Ghrāṇa*, *Rasanā* and *Tvak*–visual, auditory, olfactory, gustatory and cutaneous respectively. We use them for sensing and *Manas* and the senses together for perceiving.

159. *Brahma* (54), life of the most divine of gods. This type of life is said to top the *Bhautika Sarga*. It is the most *Sāttvika* of all possible lives.

160. *Bhāgya* (50), destiny-here contentment consequent upon dependence on destiny–to depend upon fate and do nothing for attaining *Kevala Jñāna*. It is one of the four *Ādhyātmika Tuṣṭis*.

161. *Bhāva* (40, 43, 52), mental disposition. According to *Īśvarakṛṣṇa* there are eight principal *Bhāvas-Dharma*, *Adharma*, *Jñāna*, *Ajñāna*, *Rāga*, *Virāga*, *Aiśvarya* and *Anaiśvarya* (K23). But there are innumerable degrees in which each of them operates. I. K. therefore believes in a whole *Sarga* of them. *Bhāvas* are the forms of which *Buddhi* takes. *Buddhi* is an *Antaḥkaraṇa* and thus a part of a *Liṅga*. In this way its *Bhāvās* are a part of the *Liṅga*. His *Liṅga* is a constituent of every *Puruṣa*[2] and thus his *Bhāvas* form the very mental constitution of every individual.

Most of our *Bhāvas* are *Prākṛta* i. e. they are in our nature by virtue of our having a *Guṇātmaka* component. There *Bhāvas* are getting constantly modified by our experiences and behaviour. These modified *Bhāvas* are called *Vaikṛta*. In some extraordinary individuals the *Sāttvika Bhāvas* are fully developed from the very beginning and thus there is no trace of the *Tāmasa Bhāvas* in them. These *Sāttvika Bhāvas* are termed *Sāṁsiddhika*. From all this it is clear that there cannot be a *Liṅga* without *Bhāvas*, nor can a *Bhāva* exist or be satisfied by resulting into action if there is no *Liṅga* to contain it.

162. *Bhūta* (22, 38), the elements *Ākāśa*, *Teja*, *Vāyu*, *Āp* and *Pṛthvi*. The *Bhūtas* are the comparatively gross forms of the subtle *Tanmātrās* and each has the qualities of the

one or more of them. *Ākāśa* is the gross form taken by only one *Tanmātrā* viz. *Śabda*, *Vāyu* by two, namely, *Śabda* and *Sparśa*; *Teja* by three, viz. *Sabda*, *Sparśa* aud *Rūpa*; *Āp* by four viz. *Śabda*, *Sparśa*, *Rūpa* and *Rasa*, and *Pṛthvī* by all the five of them.

The *Bhūtas* are said to be *Śānta*, *Ghora* or *Mūḍha*, as also *Sukṣma*, *Mātāpitṛja* or *Prabhūta*. They are *Viśeṣa* compared to *Tanmātrās* which are considered to be *Aviśeṣas*.

Bhūta[2] (56, 69), everything *Guṇātmaka*, the entire creation. The knowledge, which enables *Puruṣas*[2] to attain *Kaivalya* and which is the gift of the sage Kapila is a discussion of the appearance, continuance of all the *Bhūtas* in this sense.

163. *Bhūtadi* (25), the *Tamas* predominant variety of *Ahaṅkāra* which takes to form of the five subtle *Tanmātrās*.

164. *Bheda* (15) that which is differentiated. Things which can be differentiated from one another are all limited and finite. Therefore there must be an unlimited, undifferentiated, indiscriminate reality in which they are grounded and which is their material cause. This is an argument in favour of the reality of *Avyakta*.

The ancient Indian thinkers were not satisfied with change being the last word in philosophy. They therefore postulated an indiscriminate, formless reality and considered it to be the uncaused cause of the universe. The universe is in this sense the Kārya (effect) of *Avyakta*.

165. *Bhoktṛbhāva* (17), feeling pleasure and pain. All of us *Puruṣas*, are affected by this hedonic tone of experiences; and this is put forward by *Īśvarkṛṣṇa* as a proof of the existence of *Puruṣa*s. See *Akartṛbhāva*.

166. *Bhautika Sarga* (53), various types of life made available by *Pradhāna* for *Puruṣas*[2] to live. In K54 they are described as *Brahmādistamba Păryanta*. Of these there are eight varieties of super human (*Deva)* life, five of animal and plant life and only one kind of human life.

Sattva is said to predominate in lives at the upper end of this scale. In Kārika 44 *Dharma* is given as the means of rising in this scale of lives.

Practising *Dharma* leads to a superior order of life which is preponderantly *Sattvika*.

167. *Manas* (7, 27), one of the 13 *Karaṇas* which is an *Indriya* as well as an *Antaḥkaraṇa*. As one of the *Indriyas* by simultaneous association, it connects sense with percepts and vague motor drives with concrete action impulses. As one of the three *Antaḥkaraṇas*, *Manas* imagines, wishes and desires. Absence of perception, though senses are being stimulated, is therefore called *Manoanavasthāna*—absent mindedness and considered by *Īśvarakṛṣṇa* to be one of the causes of imperceptibility of objects. Activity of *Manas* is implied in perception as it is in impulses to perform such and such an action.

168. *Mahat* (3, 8, 22, 40, 56), *Prakṛti* in action, *Prakṛti* is thus the material cause of *Mahad*. But this casual connection is not like that between two phenomenon, nor is it perceptible or introspectible. It appears that *Prakṛti* and *Mahad* are one and the same thing looked at from two different points of view. The *Vyakta* aspect of *Prakṛti* is *Mahad* and the *Avyakta* aspect of *Mahad Prakṛti*.

As *Prakṛti* is the material cause of *Mahad*, the latter is that of *Ahaṅkāra* and in this sense they are both *Prakṛti*. But *Prakṛti* is *Avikṛti*, i. e. it is not the effect of any thing else, while *Mahad* is *Vikṛti*. Hence it is called *Prakṛti-Vikṛti*. So are *Ahaṅkāra* and the *Tanmātrās*. *Īśvarakṛṣṇa* considers *Prakṛti* to be the cause not only of *Mahad* but of everything. He has therefore used the expressions *Mahadādi*, *Mahadādisukṣma Paryanta* and *Mahadādi Viśeṣabhūta Paryanta*. All this shows that, according to him, in the strict sense of the word 'effect' while the *Śānta*, *Ghora* and *Mūḍha Viśeṣas* actually exist and are the true effects of *Prakṛti* intervening *Prakṛti Vikṛtis* are all abstractions. They do not exist in the sense in which the *Viśeṣas* mentioned above exist, though they are said to form a causal chain, as they were all separately existent phenomena. The significant expressions used by *Īśvarakṛṣṇa* clearly indicate that this is not his theory.

The *Mahadādiviśeṣabhūta* are the particular individual existents in which by close and careful investigation we discern the *Prakṛti-Vikṛtis*. Underlying all of them is *Mūlaprakṛti (Pradhāna)* which cannot be discerned in any way. It is known only by inference on the supposition that there must be a real noumenal cause of phenomenal reality. Thus in *Īśvarakṛṣṇaś* view *Mahad* is the *Guṇātamaka* reality which exists in and through the *Śāntā*, *Ghora* and *Mūḍha Viśeṣas*. But he believes that *Mahad* is not the ultimate *Guṇātmaka* reality. Underlying it there is its material cause *Pradhāna* or *Mūlaprakṛti*.

169. *Mahāmoha* (48), one of the five kinds of *Viparyaya*. *Īśvarakṛṣṇa* has not explained *Viparyaya;* but since in the Kārikā following the one in which *Viparyaya* is said to have five varieties he speaks of the varieties of *Tamas*[2], *Moha*, *Maha moha*, *Tāmisra* and *Andhatāmisra*, it is clear that these five are the *Viparyayas* which the commentators equate with *Patañjali's* five *Kleśas* and therefore *Mahāmoha* with *Rāga*. Corresponding to the five sense organs there can be

five kinds of percepts about which we all know and five kinds about which we have only heard from the seers. The commentators explain the tenfold nature of *Mahāmoha* by relating to these ten kinds of percepts.

170. *Moha* (48), sloth (cf. *Kapilāsurīsaṁvāda.*) One of the five *Viparyayas*. It is generally identified with *Kleśa Asmitā* and the commentators connect the eight form of *Moha* with the eight aṇimādi siddhis. This connection can however, be established only if we interpret the word *Moha* as pride. The relation of these *Siddhis* with *Moha* as *Asmitā* is rather farfetched.

171. *Mātāpitṛja* (39), fertilised ovum. Every *Liṅga* unconsciously finds a suitable *Mātāpitṛa* and appropriates it. Then it becomes the body of a living being.

172. *Mādhyasthya* (19), remaining unconcerned, not being soiled by *Rāga* or *Dveṣa*. Just as the dṛṣta of *Puruṣa* is different from that of *Liṅga*, the sukha-duḥkha of *Puruṣā* too is different from those of the *Liṅga*. The dṛṣtā of *Puruṣa* is of the nature of introspection. The sukha-duḥkha of *Puruṣa* are of the nature of *Bhoga*.

173. *Mithuna* (12), Blending, work of the three guṇas blend. This is one of the four ways in which they are related to one another, the other three ways being *Abhibhava*, *Āśraya*³ and *Janana*. Different feelings may blend and form unique experiences.

174. *Mūḍha* (39), one of the three kinds of *Viśeṣas*-that which matter brings peace not agitation to us. One and the same object can be *Śānta*, *Ghora* or *Mūḍha* under different circumstances.

175. *Mūlaprakṛti* (3), See *Mahad* and *Avyakta*.

176. *Rajas* (13, 54), one of the three *Guṇas*. It is said to be responsible for movement. As compared with *Sattva* and *Tamas*, Rajas is movement which is neither too fast nor too slow to be perceived. *Rajas* is supposed to be the mover and agitator. Consciousness is predominantly *Sāttvika*, but *Rajas* also plays its part in it. In consciousness its effect is agitation, motivation, prompting, etc. This is its *Aprīti*.

Sattva, *Raja*s and *Tamas* are used as relative terms signifying degrees of superiority, goodness, desirableness etc. Hence the middlerange of the *Bhautika Sarga*–scale of lives is said to be predominantly *Rājasa*, the upper one *Sāttvi*k*a* and the lower one *Tāmasa*. *Prakāśa* and *Prīti* are the superior end and *Sthiti* and *Viṣāda* the inferior end, *Aprīti* and *Upaṣṭambha* being the middle range.

177. *Rasanā* (26), the gustatory sense. See *Indriya*.

178. *Rāga* (45), attachments, desirés, hankerings etc. These necessitate transmigration. In K23 the *Bhāva* called *Rāga* is said to be *Tāma*sa as *Rāga* is the opposite of *Virāga* which is *Sāttika*. Since all the *Guṇa*s are present every where, *Rāga* etc. are *Tāmasa* in the sense that *Tamaṣ* predominates in them. *Rājāsa Rāga* in *Kārikā* 45 therefore means the *Rajas* element in the *Tāmasa* *Rāga*. is also *Rājasa* in sofar as it causes transmigration.

It inheres in *Liṅga* and is a part of the character of every *Puruṣa* and remains with it as it lives one life after another.

179. *Laghu* (13), fine, light, quick. *Sattva* is so described. The manifestation of *Sattva* in living being is seen in their alertness, quickness, intelligence etc.

180. *Liṅga*[1] (20, 40, 41, 52, 55), the subtlest *Guṇātmaka* in individual. *Liṅga* is described by *Īśvarakṛṣṇa* as *Mahad-ādisukṣma-Paryanta.* A *Liṅga* is a particular individual a *Sukṣma Viśeṣa*–which has its being in *Mahad.* Hence the statement that if there were no *Viśeṣas* there would be no *Liṅgas* (K41) without a *Mātāpitṛja* and a *Prabhūta* type of *Viśeṣa.* Thus *Sukṣma Viśeṣa* and *Liṅga* are one and the same thing.

Liṅga is a *Liṅga* because it is in *Ṣaṁyoga* with a *Puruṣa* and since every *Saṁyoga* is said to be beginningless every *Liṅga* should also be beginningless. This is its *Purvotpatti.*

Being an extremely subtle entity, the movements of a *Liṅga* are not obstructed in any way. It can enter even an impervious rock or stone. Being *Sukṣma*, *Liṅga* survives the death of the body.

According to *Īśvarakṛṣṇa*, a *Liṅga*, as such does not experience pleasure or pain. It is only when it takes a *Mātāpitṛja* that experiences come to vṛtti. It is for this reason that *Liṅga* is said to go from life to life without feeling pleasure or pain.

Without a *Mātāpitṛja* and a *Prabhūta* type of *Viśeṣa* a *Liṅga* cannot be said to exist as things of the world do. It is real as *Mahad*, *Antaḥkaraṇa* and *Indriya* are real. But it exists only when it lives a life in a body. Deep metaphysical thinking reveals this difference between reality, only as reality, and existence. A thing may be real without being existent. Thus all the three *Viśeṣas* are the *Āśrayas* of *Liṅga*, and I. K. is justified in the use of the plural *Viśeṣaiḥ.*

However, the *Bhāvas* which motivate the behaviour of *Puruṣas*[2] are said to reside in *Liṅga* and to have no existence except in a *Liṅga*[1]. *Bhāvas* are a part of the constitution of the *Liṅga*[1] in which they inhere. They form the very structure of the *Liṅga*.

All the various *Liṅgas*, of which the number is legion, constitute the *Liṅga Sarga*. After a *Puruṣa*[2] has attained *Kevala Jñāna*, his *Liṅga*[1] has nothing more to do and when the body of such a *Puruṣa* dies this *Liṅga* leaves its individuality and merges *Avyakta*. But so long as a *Puruṣa* remains in the dark and lives his *Liṅga* remains intact.

Every *Liṅga* takes one life after another just as an actor plays different roles in different dramas. All there roles are made available to *Liṅga* by *Prakṛti*. The significance of the word saṁsarati is that having its being in *Mahad*, *Liṅga* does not jump from one life to another. It only shifts.

Liṅga[2] (5), something which points to the existence of something else–here a proposition from which another necessarily follows. The former is called premise and the latter its conclusion; and the premise–conclusion relation–the relation of evidence–is the *Liṅgaliṅgi* (relation). If fire being there follows from smoke being there. The latter is the *Liṅga*[3] of the former, which is its *Liṅgi*.

Liṅga[3] (10), literally that which merges tn something, all the forms which the changing *Guṇātmaka* reality takes. *Vyakta* is here said to be *Liṅga*[3]. As opposed to this *Avyakta* is not the form which any other reality, called its matter, takes. This is said to be one of the important differences between *Vyakta* and *Avyakta*. The former merges in *Avyakta*, which does not merge in any other matter.

181. *Liṅgi* (5), that which necessarily follows from something which is its *Liṅga*.

182. *Vacana* (28), speaking, the function of the *Vāk Karmendriya*.

Īśvarakṛṣṇa considers *Vacana* to be confined to the use of a spoken conventional language of words. The other means of communication do not come under *Vacana*. It seems that they distinguished between the act of communication and the means of communication. All that a human being communicates to other human beings cannot be expressed in gestures. Hence the importance of words.

183. *Varṇaka* (13), that which restrains, causes obstruction. See *Tamas*.

184. *Vāk* (26, 34), the *Indriya* which enables living beings to speak. The *Viṣaya*² of *Vāk* is *Śabda*², which is the stimulus for the ear alone. The other *Karmendriya*s may stimulate any or all of the five senses.

185. *Vāyavaḥ* (29), the unlearnt reflex responses, which maintain life. Chief of them is *Prāṇa*–respiration. They are not the functions of any one *Karmendriya*, but are said to be the joint work of all the *Karaṇas*. See *Dhāraṇa*. They speak of the five *Vāyavāḥ–Prāṇa*, *Apāna*, *Samāna*, *Udāna* and *Vyāna*. But essentially these are the various ways in which the one impulse to live works. The one name for all of them is *Prāṇa*.

186. *Vikāra* (3), different shapes taken by the same thing on account of changes occuring in it. Here the word is used as a technical term for the eleven *Indriyas* and the five *Bhūtā*s to signify that they are *Vikṛti* without being *Prakṛti*.

187. *Vikṛti* (3), effect in relation to a material cause. Literally *Vikṛti* and *Vikāra* have the same meaning, but *Īśvarakṛṣṇa* calls *Mahad*, *Ahaṅkāra* and the five *Tanmātrās*,

Vikṛtis and the eleven *Indriyas* and the five *Bhūtas*, *Vikāras* obviously because they are not *Prakṛti* as opposed to *Vikṛti* and as compared to *Tanmātrās*, they are themselves called *Viśeṣas*. *Īśvarakṛṣṇa* applies the term *Prakṛti* in this sense only to those *Tattvas* which are the material cause of other *Tattvas*.

Thus though in one sense, the *Vikāras* can be said to be neither *Prakṛti*[1] nor *Vikṛti*, they are the forms which *Prakṛti*[2] takes and are in the literal sense, *Vikṛti*. *Īśvarakṛṣṇa*, therefore, does not say that they are neither *Prakṛti* nor *Vikṛti*. This expression he reserves for *Puruṣa*[1] who in no sense whatsoever either*Prakṛti* or *Vikṛti*.

188. *Vijñāna* (2), *Jñāna*[2]. A thorough, systematic and exhaustive knowledge of *Vyakta*, *Avyakta* and *Jña* is, according to *Īśvarakṛṣṇa*, the best and the purest means of getting rid of the threefold pain. *Kevala Jñāna* follows the complete mastery of this learning. *Kevala Jñāna* also brings *Kaivalya* which is the only state completely and permanently free from pain.

189. & 190. *Viparyastam*=*Viparyāsa* (19, 23, 45), opposition, being entirely different. All the distinguishing marks of *Puruṣa* mentioned in Kārikā 19 are said to follow necessarily from the *Puruṣa* and *Prakṛti* principles being essentially different from each other. Absence of the *Bhāva* called the *Aiśvarya* amounts to meeting with insurmountable obstructions. The opposites of *Dharma*, *Jñāna*, *Virāga*, and *Aiśvarya* i. e. *Adharma*, *Ajñāna*, *Rāga* and *Anaiśvarya*, are said to be the *Tāmasa* contents of *Buddhi*. The opposite of *Jñāna (AJñāna)* leads to *Bandha*, which is the opposite of *Apavarga*. Similarly *Anaiśvarya*, i. e. absence of *Aiśvarya*, means *Vighāta*, the opposite of *Avighāta*.

191. *Viparyaya*[1] (14, 17–8, 44–5, 69), different, the opposite. *Prakṛti* is *Aviveki* etc. because it is *Guṇātmaka*. If it were not so, it could not be *Guṇātmaka*. The commentators explain by adding that the *Puruṣa* principle is not *Aviveki* etc. and it is not *Guṇātmaka* either. In support of the Sāṅkhya theory that there are *Puruṣās* and there are many of them, I. K. argues, that we find *Puruṣas* to be in every way different from the *Guṇas* of the composition and proportion of the three *Guṇas* and consequently their mental structures to be different in different individuals. According to I. K. absence of the *Bhāva* called *Jñāna*, i. e. *Ajñāna*, leads to the continuence of *Bandha* and that of *Aiśvarya* i.e. *Anaiśvarya* means that the obstructions in his way have not been surmounted by the aspirant not endowed with *Aiśvarya*. Absence of the nine *Tuṣṭis* and eight *Siddhis* makes seventeen out of the twenty eight *Āsaktis*. They are here called *Buddhibādhās*. A *Buddhibādhā* arises if one misses any of the *Tuṣṭis* or *Siddhis*.

Viparyaya[2] (46, 47), five of fifty experiences which according to one arrangement, constitute the *Pratyaya Sarga*. *Īśvarakṛṣṇa* does not say in so many words that the experiences for which *Tamas*[2], *Moha*, *Mahāmoha*, *Tamisra* and *Andhatamisra* are responsible are these five experiences, but since he has counted the variations of these five among the fifty members of the *Pratyayasarga*, it is clear that he means such experiences. Though *Viparyaya*[1] is *Ajñāna*, there is an important difference between the two. The former is a *Pratyaya*, the latter a *Bhāva*. Corresponding to every *Bhāva* there is an experience. But while an experience is a passing process, the motivating *Bhāva* is abiding. It is a part of one's psychological makeup and is not effaced with the death of one's body. *Īśvarakṛṣṇa* does not include *Rāga* in *Ajñāna*. He considers it to be a *Bhāva* in itself. *Ajñāna* for him, is absence of discriminative knowledge of *Vyaktāvyaktajña.*

192. *Vibhāga* (15), each appearing as different from the other; here emergence of effects in their material cause. See *Avibhāga.*

193. *Vibhutva* (42), far reaching capability. *Prakṛtervibhutvayoga,* therefore, means *Prakṛti* being i. e. capable of doing much. Since the vast *Bhautikasarga* is made available to it by *Prakṛti*[2] exery *Liṅga* takes different lives one after the other as an actor plays different roles one after the other *Vimarda* (46), *Abhibhāva.*

194. *Vaiṣamya* (46), mixing in different proportion. Multiplicity of the experiences which constitute the *Pratyaya Sarga* is due to their mixing in different proportion and consequently their relative dominance and subjection of the different *Guṇa*s. Being the function of *Indriyas,* consciousness is essentially *Sāttvik*a.

But the *Guṇas* do not work in isolation. Each *Guṇa* is in some degree present every where and variations in experience are caused by relative increase in the influence of the differnet *Guṇas.* This is *Guṇavaiṣamyavimarda.*

195. *Vimokṣa* (56–8), *Kaivalya.* The innumerable *Guṇātmak*a particulars in whom searching investigation can reveal the working of the twenty- three *Tattvas*– from *Mahad* to the *Viśeṣas*– are all there to minister to the *Vimokṣa* of the different *Puruṣa.*[1]

196. *Virāga*= *Vairāgya* (23, 45), detachment, which is one of eight *Bhāvas* and can be cultivated by effort. Complete *Vairāgya* without *Kevala Jñāna* leads to *Prakṛtilayatva*

197. *Viśeṣa*[1] (16), specific, different from all others. Every form which the *Guṇas* takes is a particular combination different from all other combinations.

Viśeṣa[2] (34), concrete as opposed to abstract, percept as opposed to sensum. As a sense organ is stimulated we sense a quality like hardness and at the same time perceive a hard object. The latter is a *Viśeṣa*[2] *Viṣaya*. Co-operation of *Manas* with the *Indriya* is necessary for doing this. See *Āviśeṣa*.[1]

Viśeṣa[3] (38, 39, 41), a *Tattva* which is iowest in the scale of generality. The five *Bhūtas* are considered to be *Viśeṣas*[3] in this sense. There are no other *Tattvas* more particular than these. From another point of view *Sukṣma*, *Mātāpitṛja* and *Prabhūta* are the three *Viśeṣas*[3]. For a lay man these alone constitute the *Guṇātmaka* reality consisting of material objects living bodies and souls. But the ancient Indian physicists, psychologists and metaphysians saw in them the *Bhūtas* and the tanmātrās and the working of the thirteen *Karaṇas*, and could thus explain to the satisfaction of the discerning investigator the multiplicity, variety and complexity of the universe. The other twenty three *Tattvas* exist in and through these *Viśeṣas*[3]. They are all immanent in the *Viśeṣas*[3]. It may be that at the bottom of *Vyakta* is either a pattern of changes or a system of forming and vanishing *Kramas* and that *Avyata* is a potentiality of *Vyakta*. This makes them *Viṣaya*. On the other hand, *Puruṣa* is not based on any such thing. This is what is meant by saying that *Puruṣa* is not a *Viṣaya*. In this way *Puruṣa* remains a *Viṣaya* in the sense of being an object of thought.

198. *Viṣaya*[1] (11, 50), objective reality as opposed to *Puruṣa*. Complete disinterestedness in the five kinds of external objects visual, auditory, gustatory and tactual-forms five out of the nine *Tuṣṭis*.

*Viṣaya*² (33, 34, 35), the material collected through the *Indriyas* for being dealt with by the *Antaḥkaraṇa. Buddhi* is said to go deep into all such material and the group of ten *Indriyas* is said to convey these *Viṣayas*² to the three fold *Antaḥkaraṇa.*

199. *Viṣāda* (12), dullness, neither tranquility nor agitation. It is said to be the nature of *Tamas.* In consciousness, which is on the whole *Sattva*– dominant, the part of *Tamas* is dullness, stupidity, ignorance, which raise their heads in the state of *Viṣāda.* In the way *Viṣāda* is responsible for them.

200. *Vṛtti* (12, 13, 28. 31), work, operation. The *Guṇas* operate by one dominating over another or the other two, one generating another and combining with one another. In this way they co-operate to serve the purpose of *Puruṣa*².

Work of the senses is said to be only *Ālocana* of *Sabda*, *Sparśa*, *Rūpa*, *Rasa* and *Gandha.* But the Kārikā 34 clearly declares their *Viṣayas*² to be concrete particulars as well as their abstract qualities. *Īśvarakṛṣṇa's* theory is that the senses bring sensa as well as percepts, the latter in co-operation with *Manas.*

Work of the *Karmendriyas* consists in *Vacana*, *Àdāna*, *Viharaṇa*, *Utsarga* and *Ānanda.* Action of one *Indriya* stimulating that of another is also said to be among the functions of *Indriya*s.

201. *Vaikalya* (47), disorder or failure. An *Āsakti* is caused by dysfunction or complete failure of a *Karaṇa.* Hence they speak of thirteen *Àsaktis.*

202. *Vaikṛta*¹ (25), refined, sublime. The aspect of *Ahaṅkāra*¹ which shows the eleven *Indriyas* is so called, and

since the *Indriyas* are called *Sāttvika* and the two other aspects of *Ahaṅkāra*² are called *Rājasa* and *Tāmasa*, it is clear that by *Vaikṛtāhaṅkāra* Īśvarakṛṣṇa means *Sāttvika Ahaṅkāra.*

*Vaikṛta*² (43), acquired, developed, cultivated. *Vaikṛta*² *Bhāvas* are those which are not inborn but gradually cultivated. It may take a number of lives to cultivate *Jñāna*, as for example.

203. *Vaiṣamya* (46), relative dominance and subordination of the *Guṇas* in different degrees which is responsible for the fifty varieties of the *Pratyaya Sarga.*

204. *Vaiśva Rūpya* (15), the universe and all that it contains. *Īśvarakṛṣṇa* gives several reasons to support the thesis that there is a material cause of the universe and calls that cause *Avyakta*. The orthodox ancient Indian philosophers had a confirmed belief in a single indiscriminate, indeterminate material cause of the universe.

In the state of *Pralaya* the universe disappears but its ultimate material cause remains. According to them this first material cause is ever-lasting-not the universe as it exists. According to I. K. in the state of *Pralaya Pradhāna* is *Avyakta*; otherwise it is *Vyakta* and exists as the universe.

205. *Vyakta* (2, 10, 11), lit. actual, not only potential; one of three realities complete insight into which is the best and the purest means of permanently getting rid of the three kinds of pain. *Vyakta* is the opposite of *Avyakta* in as much as it is not the first cause, it is manifold and is neither everlasting, nor all-pervading nor self-supporting nor formless. It is many in one. But it resembles *Avyakta* in being *Guṇātmaka* objective, knowable in the ordinary

manner by perception, introspection inference, in being devoid of *Cetana* and not being a class of simple discrete individuals.

With the exception of the reality called *Avyakta*, all *Guṇātmaka* reality is *Vyakta*, which may well be defined as *Mahadādi Bhūtendriya Paryanta* reality. See *Mahad.* They are only relatively actual. They are also potential in regard to other realities.

206. *Vyavadhāna* (7), intervention, something coming in the way and causing obstruction. This is mentioned as one of the causes of imperceptibility of objects.

207. *Śakta* (9), that which has the potentiality of some thing or the capability of being the cause of one thing. (See *Sakya*).

208. *Sakya* (9), possible effect of something which is capable of being cause. Only a *Śakta* can be the cause of its *Śakya*. *Śakta* and *Śakya* are thus relative terms. Every cause must be the *Śakta* of its effect and every effect the *Sakya* of its cause. This is the well known *Sāṅkhya Theory* called *Satkāryavāda*, according to which every effect must be as real as its cause, and which necessitates a belief in *Avyakta* (See *Vyakta* and *Satkārya*).

209. *Śabda*[1] (28), physical sound which is the adequate stimulus for the ear and thus the objects of *Ālocana* through the *Śrotra Indriya*.

Śabda[2] (36), sound produced by means of the vocal organs which is said to be the work of *Vāk*. It is by means of this *Indriya* that men and animals express themselves by making different sounds.

Śabda[3] (51), Listening to the talks of these whom we consider to be competent. It is one of the marks of success, one of the *Siddhis*.

210. *Śrotra* (26), the auditory sense. See *Indriya*.

211. *Ṣaṣṭitantra* (72), an old, perhaps the oldest, work on Sāṅkhya Philosophy. *Īśvarakṛṣṇa* derived from this text the knowledge contained in his seventy *Kārikās* and claimed that he had brought in all the subjects dealt with in the original composition with the exception of illustrative stories and the views of other philosophers. Taking their cue from the title of this treatise, subsequent writers believed that the sixty topics treated in the *Ṣaṣṭitantra* were the fifty members of the *Pratyaya Sarga* and the ten *Maulikārthas*– principal tenets of the Sāṅkhya doctrine– not mentioned by I. K.

112. *Saṅkalpaka* (27), *Manas*, that which wishes and desires. *Saṅkalpa* is said to be the function of *Manas*. But wishing, desiring are the work of *Manas* as an *Antaḥkaraṇa*. As a *Bāhya Karaṇa*, *Manas* co-operates with the senses and *Karmendriyas* and enables them to perceive and perform definite actions.

213. *Saṅghāta* (17), organised whole, parts so arranged that they form a systematic unity. *Śānta*, *Ghora* and *Mūḍha Viśeṣas* are such wholes and the theory is that as men prepare objects for the use of some body or the other, *Prakṛti* has arranged these *Viśeṣas* for the use of some living beings. These living beings are individual *Puruṣa*.[1] This is a combination of the time honoured cosmological and teleological arguments advanced by *Īśvarakṛṣṇa* to prove the existence not of God–but of *Puruṣas*[1].

214. *Satkārya* (9), reality of effect–here every effect existing in some way even before it appears. According to the theory known as *Satkāryavāda* every effect is potentially present in its cause. This theory, however, applies to material causes only. To causes of phenomena as other antecedent phenomena this theory is not applicable. Growth of plants is not in any way present in shower of rain. But gold is potentially there in *Pṛthvī*, *Pṛthvī* in the *Tanmātrās*, *Tanmātrās* in *Tāmasāhaṅkāra*, all kinds of *Ahaṅkāra* in *Mahad* and of *Mahad* in *Prakṛti*. Hence Sataḥ *Saijāyate*. This is I. K.'s *Satkāryavāda*. This does not clash with the Nyāya theory of *Prāgabhāva*.

215. *Sattva* (13, 54), one of the three *Guṇas*, preponderance of this *Guṇa* in the *Karaṇas* is responsible for the kind of consciousness all of us have. Mind painted by the mentalistic psychologists is *Sattva*–dominant. In consciousness itself, however, comparatively more of *Sattva* means peace of mind. See *Rajās*, *Tamas*, *Ũrdhva* and *Guṇa*.

216. *Saptarūpa* (63), seven aspects–here the following seven *Bhāvas* which inhere in *Prakṛti*– *Ajñāna*, *Dharma*, *Adharma*, *Rāga*, *Virāga* *Aiśvarya* and *Anaiśvarya*. These *Bhāvās* seek satisfaction and hence need life after life and thus prevent the attainment of *Kaivalyajñāna* (i.e. *Kevala-jñāna)* is the only *Bhāva* which seeks no such satisfaction. Its *Vipāka* is *Kaivalya*. The other *Bhāvas* keep *Puruṣa*[2] in bondage.

217. *Saptati* (72), seventy. Manuscripts of the work called "Sāṅkhyakārikā" do not agree about the number of verses it contains. The entire subject matter is covered by the first sixty nine verses. The author has called the books *Saptati* because a closing verse is added which is 70th Kārikā.

218. *Samanvaya* (15), uniformity. Uniformity implies unity. Since uniformity is seen in nature, nature must be at bottom one reality. That reality is *Avyakta*. This is one of *Īśvarakṛṣṇa's* arguments given by him to support the existence of *Avyakta*.

219. *Samānābhihāra* (7), mixing of homogeneous substances. If two or more homogeneous substances get mixed up, the different substances are not seen. A new substance is seen instead; e. g. colour mixture. This is *Sāmānābhihāra*.

220. *Saṁyoga* (20, 21, 66), coming together. Here it is the coming together of a *Liṅga*, and a *Puruṣa* which is a unique combination. The *Guṇātmaka Liṅga* is not *Cetana* but it appears as if it were *Cetana* because it is always in *Saṁyoga* with *Cetana* (*Puruṣa*). This beginningless *Saṁyoga* with the *Puruṣa* makes a *Liṅga Liṅga*.

221. *Saṁsāra* (45), transmigration. *Rāga* is here said to be the cause of transmigration. But in Kārikā 63 seven of the eight *Bhāvas* are all held to be responsible for bondage which prevents *Kaivalya* and hence necessitates *Saṁsāra*.

222, *Samudāya* (16), rising here emergence of *Vaiśvarūpya* as innumerable *Pariṇāmas*. See *Pariṇāmatā*.

223. *Sarga* : The proof of the existence of anything lies in its being known by the *Pramāṇas*-perception, inference and testimony.

224. *Samyagjñāna* (67) *Kevala–Jñāna*. See *Jñāna* and *Saṁskāra*..

225. *Samyagvijñāya* (71), having gained a complete mastery of them. *Īśvarakṛṣṇa* is said to have gained a thorough knowledge of the teachings of Kapila and then summarised them in these verses.

226. *Saṁskāra* (67), force, momentum. Even after *Jñāna*[1] has rendered the other seven *Bhāvas* incapable of maintaining *Saṁsāra*, the *Mātāpitṛja*, and hence the *Puruṣa*, continues to live for sometime because of its own momentum as the potter's wheel rotates when no force is being applied.

This means that although it is the *Puruṣa*[3] which works its *Mātāpitṛja* by means of its *Karaṇas*, *Dhāraṇa*, which is the function of the *Karaṇas*, is also governed by certain laws of nature which *Puruṣa*[3] cannot violate. In this way, the supernatural powers are not really supernatural. They follow certain laws of nature which only the *Siddha Puruṣa*[2] knows, the other *Puruṣas*[2] do not.

227. *Sākṣitva* (19), being a spectator. *Puruṣa* being a spectator follows necessary from his being other than the *Guṇas*. As we introspect our consciousness we also introspect the psychological objects of the consciousness. Real objects are not introspected. They are perceived. Knowing the objects in this manner is called *Sākṣitva* by I. K.; and if we mentally isolate the *Puruṣa* member from the 3 membered individual that we are we can say that *Puruṣa* sees the objects and while knowledge of every object leaves an abiding after–effect the introspection leaves no such after–effects. This is the force behind the use of the word *Sākṣitva*. *Puruṣa* as such remains unconcerned.

228. *Sādharmya* (27), performing the same duty, here perception and action. *Manas* is an *Indriya* because it shares with the ten *Bāhya Indriyas* the duty of perceiving and acting. *Manas* is involved in all these activities.

By means of the other *Indriyas* we get sensations and vague urges to act. For perceiving and performing specific acts we use the *Indriyas* as well as the *Manas*.

229. *Sāmānya* (11), a whole, not a simple single individual or a class of such individuals. *Vyakta* and *Pradhāna* are such wholes made up of the three *Guṇas*. By calling them *Sāmānya Īśvarakṛṣṇa* emphasises that *Vyakta* and *Pradhāna* are not simple substances and by calling them *Aviveki* that their ingredients are not their separable members like the parts of a machine.

930. *Sāṁsiddhika* (43), fully fledged from the very beginning. Some individuals have the *Sāttvika–Bhāvas* already fully developed. They do not have to exert for cultivating the *Bhāvas*.

231. *Sāvayava* (10), having parts. *Vyakta* is the whole universe consisting of innumerable parts. *Pradhāna* has no parts but ingredients. But neither the parts of *Vyakta* nor the ingredients of *Pradhāna* are simple individuals. See *Sāmānya*.

232. *Siddhi* (4, 14), proof of existence. The proof of the existence of anything lies in its being known by the *Pramāṇas*–perception, inference and testimony. The *Vyakta* and *Pradhāna* are *Aviveki*, *Viṣaya*, *Sāmānya*, *Acetana* and *Prasava–Dharmī* necessarily follows from their being *Guṇātmaka*.

233. *Siddhi*^{2} (46, 47, 49, 51), success– here a stage of success in the attainment of *Kevala Jñāna*. They are, according to *Īśvarakṛṣṇa*, *Ūha*, *Śabda*, *Adhyayana*, not being overwhelmed by the three kinds of pain (See *Traya*^{3}), company of the thinkers with whom philosophy can be discussed and freedom from the experiences called by *Īśvarakṛṣṇa Viparyayas*. These are gradual advances made towards the attainment of *Jñāna*.

234. *Sukumāra* (61), modest. The theory is that the *Liṅga* is disintegrated and ceases to exist when *Prakṛti* is seen distinctly as other than the *Puruṣa* principle. By way of an allegorical explanation of this theory *Īśvarakṛṣṇa* compares *Prakṛti* to a modest woman, who hides herself on noticing that she is recognised as she really is.

235. *Suhṛtprāpti* (51), finding a guru with whom the seeker after truth can have enlightening conversation and whose company is inspiring and instructive. Every body who directly or indirectly helps in acquiring true knowledge, is a guru in this sense.

236. *Sūkṣma* (37), subtle. Distinction between *Puruṣa* and *Pradhāna* is subtle in the first place because none of them is perceptible or introspectible, and secondly, because the data received by *Puruṣa*[2] through the *Sattva* dominant *Karaṇas* are liable to be taken as the work of the *Puruṣa*.[1] Something in them which is much more subtle governs the activities of every living body. This subtle controller is called *Sūkṣma Viśeṣa* by I. K. The two other *Viśeṣas* of which he speaks in this context are *Mātāpitṛja* and *Prabhūta*.

237. *Saukṣmya* (7, 8), being *Sukṣma*. Here subtlety consists in being neither perceptible nor introspectible.

238. *Svastha* (64), contented, composed. On account of his *Kevala Jñāna*, *Puruṣa* stays contented and composed. This reading is preferable to Vācaspati's *Svaccha*.

239. *Svārtha* (50), anything done by any body by himself and for *Vyakta* appears to be acting in isolation for itself alone; but it turns out that whatever it does is for the use of *Puruṣas*.

240. *Hetu* (31), object, aim, purpose. All the activities of the *Karaṇas* ultimately serve one purpose, viz. the benefit of the *Puruṣa*.

241. *Hetuka* (42), that which serves the cause. *Liṅga* goes from life to life for purpose of bringing about *Kaivalya.*

242. *Hetukā* (31) See *Ākūtahetukā.*

243. *Hetumat* (10), having a material cause. *Vyakta* has a meterial cause and that is *Avyakta.*

244. *Sparśana* (26), *Tva*k. The last word of the first line of this verse is *Sparśana*k*āni* according to *Gauḍapāda* and *Tvagā*k*hyāni* according to Vācaspati Miśra.

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YOGA-MĪMĀṀSĀ

A Quarterly Journal devoted to Scientific and
Philosophico-Literary Research in Yoga

20/8/89

APRIL 1989

Vol. XXVIII. No. 1

KAIVALYADHAMA
LONAVLA-410 403 (Maharashtra) INDIA .

YOGA—MĪMĀṀSĀ

A Quarterly Organ of Kaivalyadhama
Founded in 1924 by Swami Kuvalayananda

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OBITUARY

Shri Nanubhai Dave passed away on the night of 18th January '89 at Rajkot. He was 70 years.

He came in the contact with Swami Digambarji in 1962 and soon after that he joined the Rajkot Ashrama of Kaivalyadhama and started taking keen interest in the management and day-to-day working of the Ashrama. He took personal interest in each and everything, e. g. cleaning and sweeping the ashrama premises at 5-00 a. m. to closing the gates before going to bed at 10-00 p. m.

Even though, initially interested in Shakti School of Yoga, Shri Nanubhai soon developed faith and deep respect and adoration for Swami Digambarji & his preachings.

Looking to his zeal for work, sincerity and devotion for the ashrama and Swami Digambarji, in 1972 he was made Trustee of the Kaivalyadhama Swadhya Mandal, Rajkot and a member of the Governing body of Kaivalyadhama S. M. Y. M. Samiti, Lonavla in the year 1982.

He had a special liking for Astrology and many persons have been benefited by his knowledge and experience in this field.

The Institutes have suffered a great loss due to the sad demise of Shri Nanubhai.

He is survived by his wife, Smt. Vasuben, one daughter Kumari Avantikaben alias Kuki and two sons. His daughter is following his foot steps and she is already staying in the ashrama.

We pray for eternal peace to the departed soul.

Yoga-Mīmāmsa

Vol. XXVIII April 1989 No. 1

EDITORIAL NOTES

May the maker of all make this journal a success. Blessed is the name of the Lord. May He bless the workers of the Ashrama with a happy and prosperous career as servants of the world which is only the Lord Himself objectified. May He, that has created us in His infinite wisdom, lead us to the light that is beyond all darkness.

+ + +

Shri Nanubhai Dave, member of the Governing Body of the Kaivalyadhama S. M. Y. M. Samiti passed away on the night of 18th January, 1989 at the age of 70 years at Rajkot. Institute has lost a very fine devoted and sincere worker on account of the sad demise of Shri Nanubhai Dave.

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The article 'Immediate effect of Kapalabhati on Cardio-Vascular endurance' by Shri S. K. Ganguly et. al. reports significant improvement in Cardio-vascular endurance after the performance of Kapalabhati for one minute when compared to hyperventilation.

+ + +

Shri Mahesh Dave and Dr. Bhole have made an attempt to suggest on alternative interpretation of Patanjal Yoga Sutra I : 29 incorporating the intermediate responses of the practitioners to Pranava Japa in the light of the experimental and theoretical studies in their article on the 'Effect of Pranav Japa...'.

+ + +

In the artical 'Reflections on Research Methodology and Application to Yogic Research', Dr. M. V. Rajapurkar has presented the guidelines for carrying out research in the field of Yoga based on well accepted foundations.

+ + +

Dr. Bhole has expressed his views about the concept of Kundalini and arousal of Kundalini in the article 'Anatomical and Physiological considerations of Kundalini concept' emphasising the involvement of proprioceptive, viscero-ceptive vestibular sense and the mind.

+ + +

Another article on the same subject has been presented by Dr. V. S. S. M. Rao in his article 'A Rational concept of Kundalini' by referring to the concept of five 'Koshas' and the potential power of consciousness. Dr. Rao is a past student of this Institute and he has retired as the Deputy Dean of L.N.C.P.E., Gwalior.

+ + +

Shri J. B. Saha's article on 'Vipassana-A Technology of action' is the first article on Vipassana appearing in this journal wherein the author has tried to point out the beneficlal importance of this technique for solving psycho-physical problems facing life by bringing about purification at all levels of personality. Mr. J. B. Saha is a consultant chemical engineer from Bombay.

+ + +

Lectures delivered by the eminent persons have been published in this issue for the benefit of our readers. The authors and the articles are as follows :

1) Dr. B. Ramamurthi–Mental Health and Yoga. Importance of Yoga for ill and healthy persons have been dealt with in some detalis.
2) Dr. Sarda Subramanyam–Yoga for Health.
3) Dr. T. M. Srinivasan–Yoga, Bio-energy and Health.

+ + +

Dr K. C. Khare et. al. have presented their observations of experimental studies in the article 'Haematological, Biochemical and Ventilation responses to the practice of Yoga in adults'. Their observations in respect of changes in the blood picture, blood glucose levels, ventilatory functions and chest girth are in conformity with the observations made by the earlier workers

+ + +

May the Lord give us strength to carry on this work. May He ever widen the circle of our sympathisers and thus allow us to serve His Children to the best of our ability.

Date : 21 April, 1989.

Yoga Mimamsa Vol. XXVIII, No. 1, pp. 1 to 7. April 1989.

Immediate Effect of Kapalbhati on Cardio-Vascular Endurance*

*S. K. Ganguly**

*M. L. Gharote***

*S. R. Jolly****

Abstract :

Yogic practices have been reported to improve the health and fitness of an individual. The present study was undertaken on 14 male students of R. P. T. S., Khandala with a view to see the immediate effect of Kapalbhati on cardio-vascular endurance as measured through Harvard Step Test. Significant improvement ($p < 0.01$) was seen in their cardio-vascular endurance after performing one minute of Kapalbhati as compared to the Hyperventilation.

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* This work was done under the Grant-in-aid from the Ministry of Education, Govt. of India and Maharashtra State. The paper was read in the 2nd International Conference on Yoga held in the year 1988 at Kaivalyadhama, Lonavla (Poona)--410 403.

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Introduction :

Kapalbhati is one of the cleansing processes (4, 5), which involves the forceful and tachypnic breathing. It has been studied scientifically by some investigators (1, 3, 10, 11, 13, 17). Other workers using a set of Yogic practices have found improvement in cardiovascular endurance (7, 8, 9). However, there seems to be no objective evidence showing the utility of Kapalbhati as a single means contributing to its improvement. The term "Cardio-Vascular endurance, suggests a kind of physiological fitness demonstrated through an adjustment of the heart and lungs to prolonged physical exertion" (18).

The purpose of this study was to investigate the effect of Kapalbhati on the Cardio-Vascular endurance.

Materials and Methods :

Subject : The study was conducted on 14 male students of the residential Regional Police Training School, Khandala. Their mean age, height and weight were 23 years, 170.8 cms., and 56.8 kg. respectively.

Training Programme : The subjects were trained in the technique of Kapalbhati by one of the authors for three weeks duration. The technique of Kapalbhati was as described by Swami Kuvalayananda (12). It was ascertained that the subjects were able to perform 1 minute of Kapalbhati without any discomfort with 120 strokes per minute.

Testing Procedure with Different Conditions : Everyday four subjects reported in the laboratory for the tests in the morning without any food, drink or exercise. They were given sufficient rest prior to the testing. Everyday the following four conditions were studied on the group of four subjects :

Condition A. Harvard Step Test;
,, B. Harvard Step Test followed by one minute of Kapalbhati;
,, C. Harvard Step Test followed by one minute of Hyperventilation;
,, D. One minute of Kapalbhati followed by Harvard Step Test.

Test Administration : The Harvard Step Test was selected to find out the status of Cardio-Vascular System (2). The first subject was studied for condition "A" stepping up and down on a 20'' bench for 5 minutes at the rate of 30 steps per minute. The cadence was maintained with the help of a Metronome. Soon after the cessation of stepping, the subject rested for 1 minute in a comfortable sitting posture, the pulse was taken at the carotid artery at an interval of one to one, and a half, two to two and a half, three to three and a half minutes.

The second subject first performed H. S. T. followed immediately by the practice of 1 min. of Kapalabhati. Then his pulse was recorded, at an interval of one to one and a half, two to two and a half, three to three and a half minutes respectively.

The 3rd subject was asked to perform H. S. T., followed immediately by 1 min. of Hyperventilation and his pulse was recorded at an interval of one to one and a half, two to two and a half, and three to three and a half minutes.

The 4th subject was asked first to practise one minute of Kapalbhati followed immediately by 5 mins. of H. S. T. The pulse was recorded at an interval of one to one and a half, two to two and a half, and three to three and a half minutes respectively.

The three pulse rates in each condition were converted into Index scores by using the following formula (15).

$$\text{P F I} = \frac{(\text{Duration of Exercise}) \times 100}{2 \times (\text{Sum of three pulse counts.})}$$

Conditions studied on the subjects everyday

Subject	1st day	2nd day	3rd day	4th day
1	A	B	C	D
2	B	C	D	A
3	C	D	A	B
4	D	A	B	C

Results and observations :

The results obtained are presented in Table I to III.

Table – I

HST (A) compared with HST followed by KB (B)

Condition	Mean	S. D.	Mean Diff.	SEM	t–Value	Sig. Level
A	103.57	9.25	11.93	3.92	3.04	1%
B	115.50	17.56				

It was observed from the Table – I that the mean Index score has increased by + 11.93 during the condition B which is statistically significant at the 1% level.

Table – II

HST (A) compared with HST followed by HV (C)

Condition	Mean	S. D.	Mean Diff.	SEM	t–Value	Sig. Level
A	103.57	9.25	6.43	2.23	2.76	5%
C	110.00	11.49				

It will be observed from the Table–II that the mean Index score has increased by + 6.43 during the condition which is also statistically significaut at the 5% level.

Table – III

HST (A) compared with KB followed by HST (D)

Condition	Mean	S. D.	Mean Diff.	SEM	t–value	Sig. Level
A	103.57	9.25	5.28	3.86	1.37	Not Significant
D	108.86	19.85				

Table–III shows that the mean Index score has increased by + 5.28 but is not statistically significant.

Discussion :

One of the physiological causes of fatigue is increased concentration of CO_2 in the blood due to vigorous exercise. Kapalbhati as a cleansing process seems to remove excess of CO_2 level in the blood. Regulation of CO_2 concentration in the blood is one of the important contributing factors towards increased 'C-V' endurance.

Kapalbhati is used in the Bhastrika Pranayama, the primary objective of which is prolongation of breath holding time. This is achieved by regulating the CO_2 concentration in the blood and gaining voluntary control over respiratory centre. The results of the present study go parallel with the findings of other rcsearchers (1, 3, 10, 11, 17) studying Kapalbhati. In one study it has been shown that high frequency breathing involved in Kapalbhati is innocent (6) while, hyperventilation is not (14).

Conclusion & Recommendations :

In the light of above findings, it could be said that 1 minute of Kapalabhati as well as hyperventilation (16) help to improve Cardio–Vascular endurance significantly. However, the practice of Kapalbhati shows better and safer results. Its application during games and sports may be tried.

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Yoga Mimamsa Vol. XXVIII, No. 1, pp. 8 to 17 April 1989.

Effects of Pranava Japa (Aum Recitation)

(PART TWO)

Understanding Patanjal Yoga Sutra – I : 29 "Tatah Pratyakcetanadhigamopyantarayabhavsca" In the light of personal experience*

*Mahesh Dave**

*Dr. M. V. Bhole****

Introduction :

110 observations on 40 subjects over a period of six years during 'Kriya Yoga Anusthanas' of two weeks duration once a year having three practice sessions everyday of one hour duration each, revealed that the participants had positive as well as negative responses and reactions to report after the recitation of Pranava (Pranava Japa) for 10 to 15 mins. at a stretch (Dave & Bhole, 1988). Within the limitations of this study, it was concluded that recitation of Aum usually gives rise to sensations, feelings, experiences and mental states of positive nature, meaning thereby that the individual aspires for more of them and wants the resulting mental state to continue for indefinite time. These experiences can lead to the development of a kind of existential awareness wherein any particular definable awareness of body, breathing, thoughts, emotions and the world around is totally absent. However,

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* Paper pressented in a modified form for the Oriental Conference held at Visakhapatnam on 5--7 Jan., 1989 and Abstract published in "Summaries of papers" p. 323.

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sometimes and in some individuals, unwanted sensations, feelings, experiences and mental states can also develop through the recitation of Aum and these can compel the individual to stop the practice of Pranava Japa and take recourse to something else to alleviate the sufferings before one can think of starting Aum recitation once again.

In the light of this experimental evidence, it was felt worthwhile to examine the available interpretations and commentaries on P. Y. S. I : 29 on the following premises:–

i) Sutras are not wrong;

ii) Experiences of practitioners are not wrong;

iii) Even though conventional interpretations of the sutras may hold good for those who have attained the highest, they may prove to be wrong in the case of beginners or slightly advanced practitioners who are on their way to ultimate results.

Materials and Methods :

Twenty eight commentaries on Patanjala Yoga Sutra (18 in English, 5 in Sanskrit, 3 in Hindi, 1 in Marathi and 1 in German) were studied in respect of the word meanings, translations and commentaries on P. Y. S. I : 27 to I : 32 and other related sutras wherever indicated with the aim of understanding the meaning and interpretation of I : 29.

Observations :

Understanding of P. Y. S. I : 29 conveyed by various interpretations and commentaries :

Even though the actual words and phrases varied from author to author, the overall meaning and understanding conveyed by these commentaries could be divided into three ways as follows :

Due to the practice of Pranava Japa :

1) Arises knowledge of the inner self and also the obstacles are removed (e. g. PVK, MRY, BB, MND, JHW, VVK, JWH, GF, BHD, TL, RMP, SP, KNS, SNT, DHS, DS, KLK).

2) The obstacles are removed and also there is direct perception of the inner self (e. g. IKT, TSR, APR, BHV, VGA, BMA, HKG, NS, GML).

3) The individual will perceive his true nature and will not be disturbed by any interruptions (e. g. KCH).

These have been structuralised in Fig. 1.

Discussions :

I) Without any prejudice, it has to be presumed that existing interpretations indicate the final outcome of Pranava Japa. The time required to get this final effect and stages through which one passes to reach this final goal has not been mentioned nor discussed in these commentaries i.e. the intermediary steps are not available to us.

However, the observations made with the practitioners of Kriya Yoga, wherein Pranava Japa was given as 'Swadhyaya', gives us strong indications that obstacles do seem to appear in many individuals in the beginning as well as even later on.

II) Thus it was realised that most of the interpretations and commentaries have not taken into consideration the responses of the beginners in respect of pranava japa; and a need was felt to analyse and re-interprete P. Y. S. I : 29 to encompass the intermediate responses to Pranava Japa along with its final effect even though this interpretation could appear un–conventional and non traditional to many scholars and experts in this field.

III) In the light of the various responses of intermediary nature of the practitioners during and after Pranava Japa; I : 29 has been analysed and interpreted by the authors in a more rational way as under :–

"Through Pranava Japa, the knowledge of the presence or absence of 'Antarayas' (interruptions i. e. belonging to the 'Prakriti,) and also of the transcendental state beyond them (i. e. 'Isvara') becomes available (to yoga sadhaka) through the development of internalised awareness". This has been structuralised in Fig. 2.

IV) If the new analysis of P. Y. S. I : 29 is accepted, then 'Antarayas' mentioned in P. Y. S. I : 30 and various methods to tackle them as per P. Y. S. I : 32 to 39 can be easily understood by a practical and rational mind. As the interruptions will become weaker and weaker, the glimpses of the state of 'Antaraya Abhava' will become more frequent and of longer durations. However, the internalised awareness will remain oscillating between the two states viz. the awareness of 'antarayas' and the state of 'antaraya abhavah' like the two pans of a weighing balance till the individual gets the final emancipation through complete removal of antarayas of all kinds as mentioned in P. Y. S.* I : 5, I : 30, 31 and II : 3 and the emergence of a new kind of awareness of a transcendental nature.

Conclusions :

1. In the light of the experiential data of practioners of Pranava Japa in the frame work of Patanjalis' Kriya Yoga; it will be clear that the understanding conveyed to us by various commentaries on P. Y. S. I : 29 do not refer to the intermediary responses to Aum recitation. Slightly modified interpretation of P. Y. S. I : 29, viz. "the knowledge of the presence or absence of 'Antarayas' (interruptions) (i.e. belonging to the 'Prakriti) and also of the transcendental state beyond them (i. e. 'Isvara') becomes available (to yoga sadhaka) through the development of internalised awareness", helps one to understand the intermediate responses in a better way and it can also help to impart better training.

2. This presentation also indicates the necessity to study other sutras wherein only the terminal effects of Yoga practices seem to have been mentioned without any reference to intermediate steps.

Acknowledgements :

Authors are thankful to Swami Digambarji, Director, and Dr. M. V. Rajapurkar, Asstt. Director of Scientific Research for their encouragemets and valuable suggestions in preparing this article.

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FIGURE ONE

Structuralisation of the understanding conveyed by the existing interpretations and commentaries on P. Y. S. I : 29 which do not seem to take into account the intermediary responses of the sadhaka to Pranava Japa,

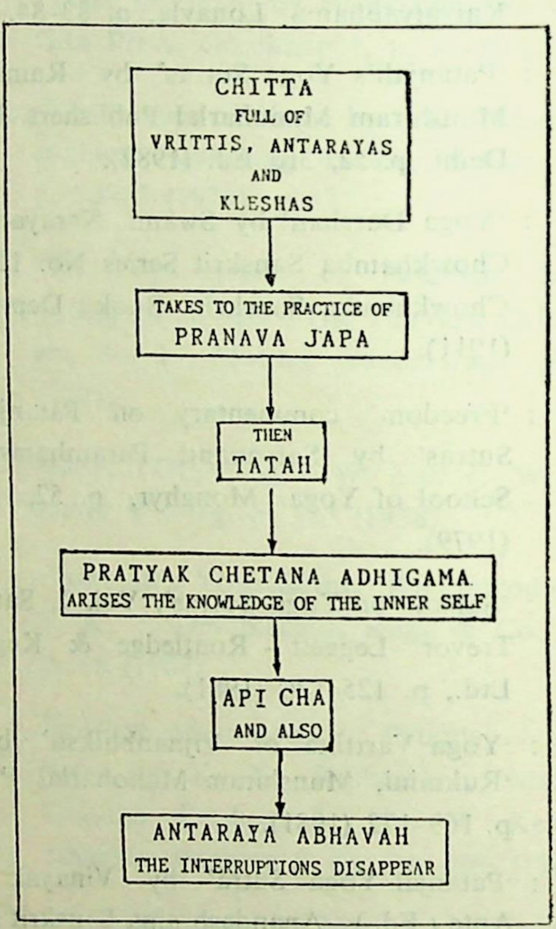
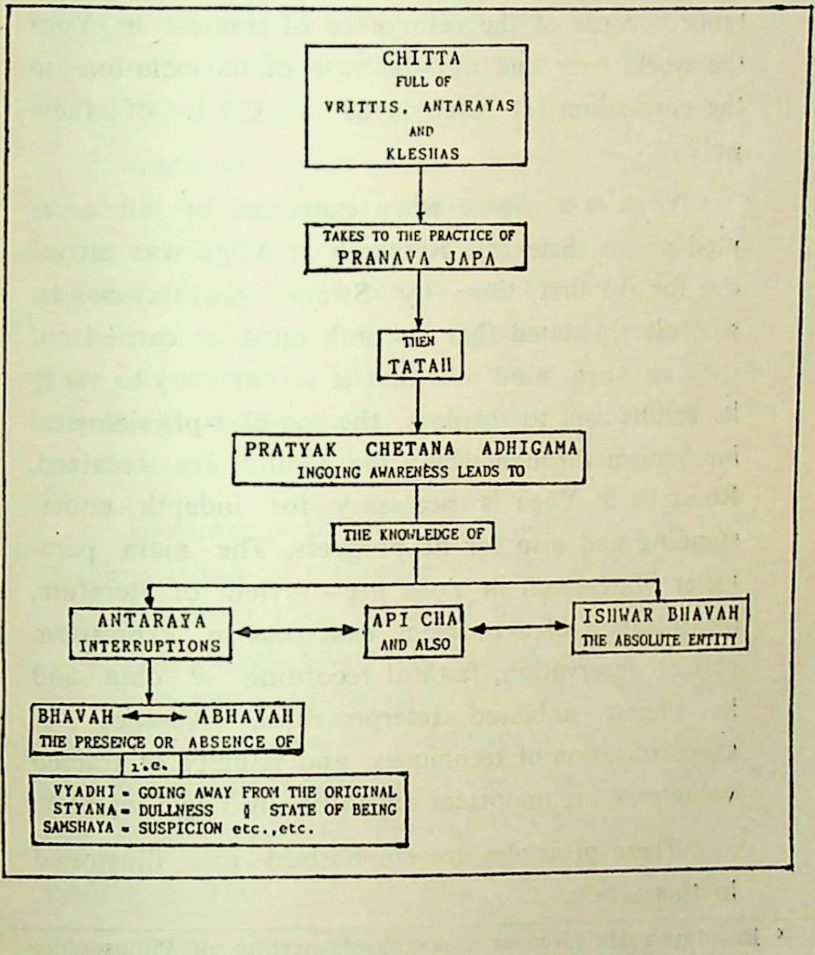


FIGURE TWO

Structuralisation of the understanding conveyed by the new analysis and interpretation of P. Y. S. I : 29 incorporating responses of intermediate nature to Pranava Japa.



Yoga Mimamsa Vol. XXVIII, No. 1, pp. 18 to 30. April 1989.

Reflections on Research Methodology and Application to Yogic Research*

Dr. M. V. Rajapurkar[**]

Abstract :

Research in Yoga has taken up special importance because of the resurgence of interest in Yoga the world over and also because of its inclusion in the curriculum for teaching as a Govt. of India policy.

Yoga is a science when examined by all accepted norms. Scientific Research in Yoga was carried out for the first time by Swami Kuvalayananda, who clearly stated that research must be carried out with an open mind and that it is our duty to verify its results and to explore the psycho-physiological mechanism through which the results are obtained. Research in Yoga is necessary for indepth understanding and also for its progress. The main parameter of research in Yoga are – review of literature, identification of a problem, exactness in expression, correct observation, faithful recording of data and its honest unbiased interpretation. Absence of standardization of techniques, and paucity of trained volunteers are important difficulties in Yogic research.

These principles are emphasised and illustrated in this article.

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* Based on a talk given at a combined meeting of Philosophico Literary Research Department and Scientific Research Department at Kaivalyadhama, Lonavla -- 410 403 (Pune) on 3rd February, 1988.

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Introduction :

In a department exclusively devoted to research it may sound superficial to speak of research methodology. It may be like carrying coal to New Castle.

My only excuse in choosing the topic is the observation that repetition is necessary even for the most obvious tenents or principles, since they have a tendency to be taken for granted and in the process they get devalued or get relegated to the background.

Research methodology in the context of Yogic research takes up special importance because of resurgence of interest in Yoga the world over. It is therefore the duty of Indian Scientists to present the teaching of Yoga in the most scientific way possible. This has become all the more necessary since yoga has been included in the teaching curriculum of students at the school and college level by the Govt. of India.

Fortunately the climate of science in our country is at the moment very favourable. After independence, in the First Five Year Plan there was hardly any allocation of funds for science. Later on, the emphasis in planning was towards science and industry and later towards applied science. Presently lot of understanding and funds are available for scientific research in basic sciences which augurs well for the future of science in the country.

What is Science ?

Before we discuss research methodology we may briefly and profitably see what 'science' stands for. Today science is changing the world around us at an ever increasing rate, creating problems as well as benefits as science progresses.

The word 'Science' comes from a Latin word meaning "to know" (Scire) and refers to any systematized body of knowledge gained through systematic study and with due regard to facts and principles.

There are three broad types of scientific research :

a) **Basic Research** : Undertaken for advancement of knowledge. Enlarges the pools of knowledge for all disciplines.

b) **Applied Research** : Undertaken with a particular application in view.

c) **Developmental Research** : Concerned with introduction or improvement of specific products.

Research in Yoga belongs mainly to 'Basic Research'.

What is Research : ?

Research has been variously defined, but in ultimate analysis it means the systematic search for truth. The Basic Philosophy in any scientific research is well stated in the following paragraphs :

1) " Scientific work must thus be carried on with an open mind, uninfluenced by preconceived ideas, **critical of its own observations cautious** in arriving at conclusions from them, ready to revise any statement, which has not stood the test of further experimenting or reasoning. Scientific truth has to be won by patient observation and persistent enquiry."

2) " Mere good wishes on the part of its protagonist or our National or Racial sentiments for the therapy should not lead us to have blind faith in it. It should be our duty to verify its results and to explore the exact

psycho-physiological mechanisms of the channels through which these results are obtained. Fortunately the rapid and great advances that modern science is making in all fields helps one to get a better insight into these processes".

(Swami Kuvalayananda)

Research in ultimate analysis must supply accurate facts, and principles with which to construct sound practice, expertise to attack new problems and a wise philosophy.

Motives of Research ?

It is difficult to say what motivates a Scientist to get involved in research. It is best stated that he "investigates knowledge for its own sake". It is a stimulus to higher endeavour. It aims to extend knowledge and establish truth-making for righteousness-and this has inspired the highest ethical thought and action down the ages.

To a scientist, praise and reward of the world has no meaning. It is love of knowledge and the joy of discovery that drives him. He faces all difficulties and is undaunted by danger.

These statements are amply justified when we look at the biography and work of eminent scientists like say Madam Curie. This also answers a question why several scientists devoted all their life to the study of insects, fish, stones or stars, etc.–a pursuit which to the common man may sound ridiculous.

The main driving force underlying scientific enquiry is man's desire to understand himself and his environment.

Methods of Research

We might legitimately ask what are the basic rules to be observed in any scientific research. I will try to list what are *the common denominators to all research*, whether literary or scientific. To my mind they are :

a) Review of Literature :

A good and *indepth review of literature* is a must before undertaking any research project. Such a review of literature gives us an insight into the problem and also helps to think of associated or allied problems which did not initially occur to us. A good review of literature should tell us what are the lacunae in our knowledge. The research can be directed to understanding the lacunae in our knowledge. Inexperienced researchers quite often undertake an investigation without first finding out what others have done. In such an attempt time is wasted to no avail.

b) Identification of a Problem :

A researchable question or *problem does not come by the way.* It is usually the result of reading, reflecting thinking and practical application. The more *precise and well formulated*are *the questions* the better are results of scientific inquiry. This fact is well illustrated from a programme of scientific investigations on Pranayama by Swami Kuvalayananda. The questions framed are reproduced :

i) Whether Pranayama enables a man to absorb more $O2$ and to eliminate more Co^2 than the ordinary normal breathing in a particular unit of time?

ii) What would be the most advantageous time unit for a round of Pranayama for O_2 absorption and CO_2 elimination ?

iii) Whether a larger time unit for a Pranayamic round leads to larger O_2 absorption and CO_2 elimination ?

iv) Has Kumbhaka a special value in Pranayama, so far as O_2 absorption and CO_2 elimination are concerned ?

v) Is it desirable to omit Kumbhaka from the technique of Pranayama, if only O_2 absorption and CO^2 elimination are aimed at ?

c) Exactness in Expression :

One should be very careful in the use of word in a scientific statement. The words we use must be exact and not lead to an unwanted and misleading interpretation. *There should be precision in expression and no verbosity.* The importance of **clarity in communication** is as important to the scientific process as logic in thinking.

Even the choosing of the title for a paper or a project, should be very carefully stated so as to state what you are going to do and can be fairly related to the objective and methodology to be used. The title should not be too lengthy nor too brief as to sound cryptic. For example, a title like "Approach of Yoga Therapy for Opthalmic disorders." The title does not indicate which opthalmic disorder in particular (of the hundreds possible) nor does it indicate which Yogic practice or practices.

d) Observation :

It is not generally understood that *seeing is not observing*. Observation is an art which has to be cultivated very carefully. It should be borne in mind that :

"Eyes do not see what the mind does not think." it is therefore, important that the mind is developed and enriched to make proper observations.

To take a simple example : If we ask a few people to walk a certain distance in a bazar street in any town and request them to record their observations separately, it will be seen that the lists do not tally even though the persons have covered the same distance in the same surrounding. Obviously the persons have recorded data depending on their background.

The story is told of a well-known Marine Biologist, Louis Agassiz, who thought that he had studied all that must be known of Marine life. He thereafter visited the laboratory of another Japanese scientist to see if there was something more to learn. The Japanese scientist put before Agassiz a specimen of fish which he had not studied earlier. Agassiz felt hurt, but sat down to complete the alloted task. At the end of the day the Japanese scientist visited him and after seeing the observation recorded, commented that there was much more that can be seen with naked eye which has not been recorded. It took day after day, 7 days of hard work befors Agassiz discovered and recorded fully all that could be observed by naked eyes in the specimen of fish. This in itself was a great lesson in observation that Agassiz learnt.

It is thus important for a scientist to realise that there is a great difference between seeing and observing. Skill in observation has to be patiently developed. Ability to observe and significance of what is observed, again depends a great deal on the intellectual depth insight and background of the observer. Better the ultimate depth, more penetrating are the the results of the observation. To take an example :– Everybody sees an apple falling from a tree, but it needed Newton to interpret its observation and relate it to **gravity** Similarly, thousands of Microbiologist the world over have been observing the zones of lyses around bacterial colonies on Mackonkie's plates, but it needed Fleming to interpret this observation in its proper perspective which led to the discovery of **Penicillin.**

e) Recording of Data :

The whole research project should be *properly planned.* Plan and design to be followed should be stated in detail. The plan should invariably have built in **controls**. If the plan has statistical analysis then the statistician should be involved in the planning from the start of the project as is said : "He should ride with the Hounds rather than come on the kill." Statistician called in to analyse an ill planned data usually is not effective. He presents a good case of 'How to lie' with statistics.

Faithful and honest recording of data is very essential. There should be no bias in recording data.

Another important parameter is **'data-reliability'**. It is checked by repeating the observations and then checking the degree to which the observations are reproducible.

Validity of data is essential for hypothesis testing. The care taken by a researcher in checking reliability of obsesvation reflects his thoroughness as an investigator.

It is also important that data should be reduced to the simplest possible form and *stored in some permanont fashion*.

i) **Sampling** ; The **sample size** should be determined before hand and the stimulus to be used should be standardised. The stimulus should not vary during the course of a series of related experiments. Sometimes it is necessary to get a truly representative, sampling. The determination of such a sample population for study is itself a critical procedure for which special methods ar available.

Statistics well-used, provides a mathematical control over an uncontrollable experiment being carried out by nature.

ii) **Cause-effect relationship** : A cause-effect relationship should not be established unless a data is rigidly scrutinized. To take an example, before Acid Fast Bacilli were accepted as responsible for Tuberculosis, it had to be shown that :

a) Bacilli can be recovered from the lesion in a guineapig.

b) The becillus so recovered can be cultivated *in vitro*.

c) When cultured bacteria were re-injected they produced tuberculcsis.

d) And they could be re-covered from the injected animal again.

Many such examples can be given here to prove that a cause-effect relationship has to pass through a series of very rigid test.

f) How does a Research Project Progress ?

As the work goes on progressing and as data starts accumulating we may find data which subscribes to our hypothesis or may be entirely different. If it is different we should still record it faithfully and see if it leads to a new interpretation or if it leads to a totally different angle to the proposed research. In a well thought out plan one solution will lead to another solution till the ultimate problem is solved.

g) Interpretation :

The same data can be interpreted differently by different people. The interpretation depends on the level of the person undertaking the interpretation. The greater the depth in understanding of the person, better and more correct is the interpretation.

It is common knowledge that in the legal profession the same case leads to different interpretation at different levels of justice.

Here the point is well illustrated by the story of a Pundit and the Shepherd boy. The story runs as follows :

'A Pundit with a lighted torch went to a King's Darbar and challenged the King's Pundit to a religious debate or to accept defeat. The question–answers went as follows :

The Pundit raised one finger, the Shepherd boy in reply raised two fingers. Then the Pundit raised 5 fingers and Shepherd boy raised a fist. The Pundit drew 7 lines with a chalk on the floor and the Shepherd boy in reply drew one line across the 7 lines. The Pundit asked by gesture the meaning of the line, the Shepherd boy in reply put forward a pitcher full of curds. At this question-answer stopped and the Pundit accepted defeat and left the Darbar. The King's courtiers were puzzled. They went to the Pundit and requested him to explain how he accepted defeat.

The Pundit said that, 'when he showed one finger he meant that there is one God, to which the Shepherd boy replied that there is one God and one Maya. The second question suggested that the body is made of 5 elements to which the Shepherd replied that 5 elements make one body. According to the Pundit the 7 lines represented the Mythological 7 seas to which the Shepherd drew one line across suggesting that there is 'Meru Parvat' across the seas.

The Courtiers then went to the Shepherd boy whose interpretation for the same was entirely different. According to the Shepherd boy "the Pundit said by raising one finger that he wants to blind his one eye to which he replied by showing two fingers that, will blind you in both the eyes. The five fingers raised to the Shepherd meant the he would be slapped to which his answer was he would retaliate with a fist. Seven lines represented to the Shepherd as 7 cakes, to which he replied that I already have 3 and half with me and I eat them with curds.

Thus given the same facts, depending on the level of ultimate insight and depth of knowledge, the interpretation differed widely. In the case of the Pundit it was highly philosophical, where as in the case of the Shepherd boy it was down to earth, mundane. This story to my mind very aptly illustrates that the *correctness of the interpretation depends a great deal on the insight and understanding of the scientist.*

Thus it is easier to make observations than to interpret them. The ability to reason correctly is important in problem solving.

Descartes also concluded that individuals may reach different conclusions was :

"There is a basic premise that if a phenomena exists" it can be measured and if it can be measured it can be understood. Anything which cannot be measured can scarcely be conceptualized, for all practical purposes it does not exist. Alfred North whitehead, has said, 'the very ground work of fruitful methodology is to start from those clear postulates which must be held to be ultimate so far as concern the occasion in question.'

Summarizing one may say that good research involves, review of literature, identification of a problem, observation, recording of data, organizing, treating the observed data and generalizations to the formulation of a theory and testing and retesting the new formulations with further observations. The real measure of science is its predictability, based on the assumption that ours is a world of law and order.' A good research is characteriszed by orderliness in planning, data analysis, and reporting.

3) All scientific enquiry should be an exercise in rigorous objective enquiry. *Objectivity* is *the* k*ey to arriving at the truth.* Eliminate personal bias, prejudices and opinions. Remember that 'Truth begets truth and error begets error.'

While concluding I would say that, we have examined the various principles and tenets which are fundamental to the conduct of good research in any discipline.

They are of greate importance and need to be rigorously followed in yogic research, if dependable and reproducible results have to be obtained. In yogic research we are dealing with subtle changes in body physiology and we are also dealing with mind body relationship and altered levels of consciousness. These are all parameters which are difficult to measure by any standard and if proper precautions are not taken may lead to erroneous results and conclusions.

Paucity of trained personnel trained in yogic techniques and further paucity of trained observers complicates the scene of yogic research. Absence of standardisation in yogic practices as stimuli also is a factor to be reckoned with. All these considerations and peculiar problems make a strong case for meticulously following of all the principles of research discussed above when planning research in yoga.

Acknowledgement :

I am thankful to Shri O. P. Tiwari, Secretary and Joint Director of Administration for encouraging me to write up the talk as an article. also like to thank Principal, Dr. M. L. Gharote for reading though the script.

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Yoga Mimamsa Vol. XXVIII, No. 1, pp. 31 to 35 April 1989.

Anatomical and Physiological Considerations of Kundalini Concept*

*Dr. M. V. Bhole***

Abstract :

The concept of Kundalini is not related to any particular anatomical structure in the body. As energy (Shakti) it can be compared with the nerve impulses working from above downwarda and below-upwards in a living body. Arousal of Kundalini could be looked upon as, 'developing an awareness of one's existance at the physical, functional, emotional and thinking levels without the mediation of the five sense organs and feed back from motor organs'., technically called as, 'internalisation of awareness'.

Experiences of transcendental aad intuitiona nature are possible after sufficient practice.

Introduction :

According to Hathapradipika, one of the aims of hatha-yoga is **'Kundalini-Prabodhanai'** i.e. to develop intensive awareness and understanding of Kundalini. Almost all the ancient texts claim that the nature of Kundalini is that of **'Shakti'** i. e. energy rather than any particular physical structure in the body. However, Dr. Rele have tried to equate it with the left vagus nerve and others have tried to compare its working with the chain of sympathetic ganglia on both sides of the vertebral column.

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* An out-line of the paper submitted for the World Conference on Kundalini Yoga Sadhana and impediments in the practice of various yoga techniques held at New Delhi on 19th and 20th Nov., 1988 by ICSTYC.

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Instead of clarifying the understanding about Kundalini, these attempts seem to lead to more confusion in the minds of the people. Thus a need is felt to make a fresh attempt to develop the understanding of Kundalini in modern medical language, which could go parallel to its description found in the traditional texts.

Anatomical and Physiological considerations of Kundalini concept :

The whole body could be looked upon as 'mere structure' requiring some kind of energy for its functioning. In yogic language it could be compared with the nerve impulses, because without the nerve impulse, a glandular cell or a muscle call cannot work while no perception is possible in the absence of nerve impulses reaching the brain. The generation and propogation of nerve impulses is influenced by various neuro-transmitters and neurohumoral substances. In ayurvedic language these could be compared with the concept of **'Rasa'** as the first of the seven dhatus. **'Rasa'** is supposed to be coming from 'Ahar' i. e. food and various other types of inputs.

Thus we find that Prana as energy is working all over the body. It is very well organised and the internal balance is maintained by it. Usually we remain unaware of its activity and become aware of it accidently or through special type of education programme. Yoga offers such an education programme.

While working with asanas, pranayama, kriyas, mudras, bandhas or subjecting ourself to **'Shaktipat'**, we start becoming aware of various body functions, either voluntarily carried out by us or which are taking place within the body without our will and effort.

Therefore the overall approach seems to be as follows :

a) developing passivity in actions
b) allowing things to happen on their own instead of
c) to develop their awareness through internal bio-feed back.

Classical five sensory and motor organs should not play an important role in developing this type of awareness. Usually, in the beginning the intensity of internal bio-feed back from various areas increase; thereby substantially influencing one's understanding about oneself. By practice one can reach such a state where even the internal bio-feed gets stabilised and even become silent if a perfectly balanced condition happens to develop at various levels of one's existence. This indicates an altered state of consciousness which is yet to come within the compass of neuro-physiological studies.

If we analyse the knowledge available to us through the internal bio-feed back, we find that as we progress in our practice (Abhyasa), we start developing awareness of breathing movements and/or touch of air and/or the postural activity in the vertebral muscles as other muscles remain in a relatively relaxed condition. Depending on the nature of these activities, one can feel as if some thing (i. e. energy) is working from below upwards or from above downwards or a particular type of activity is trying to remain localised at one particular area of the body, either at the periphery or somewhere in the core of the body. The area of experiencing may vary from the perineum to the top of the skull.

Usually throbbing sensations, heat, sensations, as if ants are crawling, very mild tremors with pleasant feelings are taken as an indication of the arousal of Kundalini. The progress of the Individual with awakened Kundalini is supposed to take place through certain stages terminating in knowledge about the self (Atmajnana) and then leading to the knowledge of the universe (Brahmajnana).

Psycho-physiological analysis of the available Kundalini experiences can be understood in the following manner.

1. Proprioceptive awareness from musculo-skeletal system responsible for body awareness.
2. Viscero-ceptive awareness from the internal organs responsible for internal awareness.
3. Sense and awareness of balance and equilibrium from the vestibular organs situated in the ear cavity alongwith (1) and (2) above.
4. Proprioceptive awareness in respect of the breathing movements contributing to forget the rest of the body.
5. Visceroceptive awareness as contributed by the touch of air and other happenings in the visceral areas due to breathing activity contributing to the 'Internalisation of awareness' (Pratyak chetana).
6. Feeling of throbbing sensations, warmth and heat in different parts of the body could be attributed to the awareness of hearts action and circulation of blood in the body.
7. Feeling states developing in such a programme could be attributed to the revival of various experiences

and memories associated with different areas and organs of the body and the values attached to them by the individual in the light of his training and education by the teacher, society and scriptures.

8. In the same way thoughts entertained by oneself could also get projected as visions or 'Adesh'.

9. It may be very difficult to differentiate between the experiencing of imbalances existing at various levels of one's existence revival of suppressed emotions and desires and projection of various thoughts from real transcendental or intuitional knowledge for a beginner in this field.

10. Spiritualising these experiences helps in the process of body and mind transcendence and this can have either positive or negative effects for the individual.

Thus we can say that the concept of Kundalini is not related to any particular anatomical structure in the body, but it seems to be related with the experiences developed from within the body giving rise to a particular kind of awareness indicating an altered state of consciousness.

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Yoga Mimamsa Vol. XXVIII, No. 1, pp. 36 to 39. April 1989.

A Rational Concept of Kundalini*

*Dr. V. S. S. M. Rao***

Abstract :

Through scientific presentation of the functions of Annamaya Kosa, Pranamaya Kosa and Vijnamaya Kosa, the author attempts to evaluate and analyse the potentialities of the dormant kundalini sakti which could be activated through yogic practices for the spiritual evolution of man.

In evolution as single cells organise into higher orders of corporate entities, special faculties emerge which is in fact the goal of evolution. Such faculties are percep-tuo-motor in nature, feedbacks, servo-mechanical regulations and maintaining homeostasis. The material structure may rightly be equated to Annamaya Kosha, sheath, layer, lamina or peel, of Yogic Physiology. Any functioning will involve movement of atoms and subatomic shifts as well in metabolic processes giving rise to electrical flow and field along the line of flow. The communication process of the nervous system is definitely of the nature of electricity. It should not surprise us if evidence is forthcoming by recording the presence and strength of flow field by the development of kirilian photography. (8) As this electric field surrounds the physical contours of the body it will not be irrational to equate it to the PRANAMAYA Kosha. As the heart and the brain function without any break, the rhythmic pulses generate waves and monitoring them by ECG and EEG recordings have become quite common in Medicine and Research. The tension of working muscles are measured in terms of electric current so generated. Galvanic skin resistance measures the permeability of the skin to electric charges under various conditions of emotion. Recently the German firm Dornier has put in the market Magneto encephalography to monitor the functioning of internal parts of the brain. Even earlier Magneto-therapy had come into vogue. It is being refined to the level of acceptability in modern medicine by Dr. Sarada Subramaniam and her coworkers in Madras. (4) Magnetic field may also be considered part of the Pranamaya Kosha as magnetism may be induced by application of electricity produced by use of magnets.

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* Paper presented to the world conference on Kundalini yoga sadhana and Impediments in the practice of various yoga techniques, New Delhi, Nov. 19–20, 1986.

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Paranjpe (2) poses a significant question whether evolution is unidirectional from unicellular organism towards Man, or at certain stage of evolution the evolved being gets the potential to direct its further evolution. With the emergence of consciousness, a higher order of feedback may be, cognition (knowledge) and goal-orientation (purpose) seem to influence the direction of evolution further as evidenced by mimicry (in sub human living beings and sapience and manipulation skills in home-sapians (man). This gives us a clue to understand the philosophy of Aurobindo : Ascent of Human and Descent of Divine. This faculty of directional consciousness may be likened to Manomaya kosha. The amount of serenity poise, expression of determination and self assurance may be a measure of this kosha but may not be amenable for instrumental measurement. Some amount of mental determination exists in everyone unless one is not in coma. The eminent neuro-surgeon Dr. B. Ramamurthy (7) in tracing the development of human brain, referring to the vast portion of cerebrum still not identified with any specific organic functioning, makes the postulate, "......... though we have the structure and the organisation for higher control of emotions existing in the brain, in practice it has not functioned. The lowest point of the brain is at the bottom tip of the spinal column and the highest point at the top of the spinal cord jutting into the skull. The new brain, cerebrum establishes contact with the vegetative brain via hypothalamus establishing numerous interconnections. According to him, Breathing being both an automatic, as well as, voluntary activity Pranayama may be a means of gaining control over voluntary processes gradually, It is the nerves issuing from the spinal cord that perceive the environment and react to it motivated by self preservation (programmed in genes) primarily and self actualisation/self realisation (imposed by will power).

A normal man does exercise some 'choice' and 'will power' in his functioning (1). It will be disastrous to get full control over body functioning unless one has developed wisdom in his search for reality by Samaptati. Even in designing machines man takes care to incorporate 'feedback' and 'Servo-mechanical' devices to minimise accidents due to 'human error'. This widom, Prajna, (it becomes absolutely truthful only on attaining highest level of Samadhi) infuencing 'manomaya kosha' may be identified with Vignamaya Kosha. Though it may never become amenable for instrumental measurement, any average intelligent man can recognise a man of abundant wisdom by his charisma and demeanour. Obviously this will be minimally developed in man in nature and has to be developed to greater extent by Yoga. Afterall even Annmaya kosha needs developing by applying principles of nutrition and fuctional use of body parts.

The word Kundalini is not used by Patanjali. But a whole chapter out of four is devoted to expanding consciousness extending into parapsychic realms by practising Samapathi (Meditation) preparing the body preliminarily by progressively practising Pranayama, Asanas, Yama & Niyama being basic steps in the descending order of hierarchy.

Rudrayamaḷa states चैतन्या कुण्डली शक्तिर्वायवी बलतेजसा (Caitanya's coiled sakthi flagged by the force of Vayu 16). Thus Kundalini may be conceived as a dormant internally confined power potential of consciousness which becomes manifest in superior perceptions and creativity when it is directed to make better use of instruments of sensation and motoric activities. Our sense and motor organs have more potential than they normally express is proved by the reality to Drug Abuse in Sports performance. Let us use Yoga and not drugs and let our goal of excellence be more broad than restricted to any one sphere of human culture.

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Yoga Mimamsa Vol. XXVIII, No. 1. pp. 40 to 49. April 1989.

Vipassana—A Technology of Action

J. B. Saha

Abstract :

The author seriously attempts to justify the value of vipassana system of meditation which may be beneficial for solving all types of psycho-physical problems facing life by bringing about purification in all levels of personality.

Everybody is quite familiar with words like Action-Reaction-Inaction. However, all of us like something and dislike something else. If somebody becomes unjust to us, harms us, makes wrong accusations against us, tries to protect himself by making us a scape-goat, we get annoyed, irritated and ultimately angry, If anger is projected further, it generates ill-will, bitterness, prejudice and hatred. All these responses from dislike to hatred arising out of human interactions are called Reactions. Stimulus for these Reactions is outside and is called Inter-action.

Now take an exactly opposite example of a real life situation in which your neighbour, friend or a brother is fair towards you, kind, nice and helpful, not only he does not want to harm you but at times he wants to protect you. Your behavioural response- a Reaction-once again arising out of this Interaction is friendliness, a smile, gentleness, kindness, benevolence and love.

There is also a third Reaction not arising out of Interactive process, but happening in the outside world without our participating in it-without our interaction but in persons around us or familiar to us. If they prosper, if they become outstanding in their professional achievements, if they become successful businessmen, if they become leaders of community, achieve name and fame are welcomed and respected wherever they go or even when we are successful, they overtake us in their degree of success, and if they happen to belong to the first group of people, against whom our response ranges from dislike to hatred, we become unhappy to get this news. We become out of mood, sorry sometimes depressed about these happenings and reverse becomes the case, if this group of people fail in life, get disrespect and miserable. This is an inner Reaction to an external happening. Name of this Reaction is Jealousy. It makes us blind towards fact, truth or reality. But it also creates an illusive and imaginative reaction which we believe Real.

There are many other combinations of above processes which generate a reaction of Hatred, Love and Jealousy. Hatred can also be stored in our system as irritation if w get wronged in a situation when we are helpless and unab to hit back.

A reaction when it is expressed in any form either Hatred or Love leaves the system neutral. If the system is neutralised after angry exchange of words, result is weakness. Otherway round, it results in all kinds of strength, but again neutral and relaxed.

A system in which negative responses like Hatred or Jealousy get stored, becomes a system under stress. Tensile stress or what we usually call tension is the result of stressed situation in which we live and cannot correct it. Living under this situation and if we happen to be a factory Executive and make an imaginary situation that there should be enough sale of our products with adequate profits and there should be no labour strikes or as children, we would like to pass with First Class with distinction or get admission in Medical or Engineering or any other such ambitions and if this imaginary condition is punctured a Reaction starts.

If some one is lazy, dull or weak, he submits to this loss of ambition or failure. This resignative attitude is called Inaction. System is without tension, neutral and relaxed but at a very low energy level.

A system under a tensile stress or tension resulting from a failure, frustration or loss of ambition, shows abnormal behavioural responses. Sometimes, it loses temper out of proportion to the external cause; it gets irritated even in small matters. If something happens the way it wants, it becomes over–joyous. If it starts talking or working, it loses awareness of time or proportion. Sometimes it goes on harping on the same thing again and again out of proportion to the incident. With threefold duties at home, business and society, system Reacts in an unbalanced way, heavily in favour one to the exclusion of other duties. These systems are called Stressed Systems, weak and unbalanced, degree of unbalance depending upon the amount of stored up stress.

Again there is Cause–Effect relationship between stress and weakness. Stress increases weakness and weakness then further increases stress build-up. Its ultimate outer symptoms are Depression, anxiety, fear, sadness, frequent loss of temper, irritation, lack of concentration, pessimism, loss of enthusiasm, forgetfulness while working, remembering trivial hurts, extra sensitiveness to small happenings etc. It is a fairly explosive situation – a time bomb nearing its time of explosion. It becomes self charging, keeps on exploding time and again till it becomes a victim of some disease which leaves the system extremely weak and unable to explode with noticeable strength. It leads the system from Reaction to Inaction.

So far we have talked about Interaction replied either with Reaction or Inaction, Reaction either internal or external – both finally leading to weakness, fear and inaction.

A real life situation will always be mixed one – some people behaving in a fair and just way, some the other way round – some going ahead of us, some remaining behind us. The proportion of these events or times at which we become victims of our internal hatred or jealousy are the times where some defence is necessary. Defence must have both strategy and technology and end result must be the victory – victory against our own enemies – our jealousy, greed or hatred. Victory must be tangible in the sense that we should feel once again buoyant, energetic, youthful etc.

Vipassana system of meditation to my mind gives us strategy as well as technique. Strategy is to isolate the system for the time being from all sorts of external Interaction like dealing with people, talking to them (even on telephone), organising or directing business, reading a newspaper, keeping a diary, prayer, Rosary, worship anything. It protects the system completely from all types of Interactions – Direct or Informative. In a way, it leads the system to surrender to the nature completely for the time-being.

Now it is a well known Law of Nature that as you stop charging something – in this case your own self – a process of Discharge starts. Nature acts like a large Reservoir in which all negative charge can be discharged without it itself being charged.

Ten days at Igatpuri are really ten days of Discharging. If the stress build-up is heavy, ten days are not enough – and repetitive camps become necessary till one feels buoyant and joyful again.

However, when one relieves the stress build-up in the system, he learns to Act. According to Buddha there are only four types of Action in response to every situation in Life Reactive or otherwise – and they are –

Love or Friendship
Compassion or Help
Humour or Smile
Indifference or Neutrality

It is worthwhile to know how to Act – what is Action, by properly understanding these words we have nothing to lose except our sorrow or sickness – an effort worth attempting – full of Reward.

Having dealt with what constitute Reaction, Action and if these words are not properly understood and corrected, how they lead to Inaction (Lower Energy Level), we now turn to the main theme of this Article, how Vipassana Technique leads us from Reaction to Action.

All of us are well aware of the Second Law of Thermodynamics as to how spontaneous Processes lead to Lowering of Energy Levels and under what conditions reverse process takes place. Vipassana technique is reversing this Process so as to reach a higher state of Energy Level– a level where confusions, contradictions change into system, order, bliss and joy.

All outward movements of the energy of the inner psyche lead to lowering of Enegy Levels. Reverse process has to take place by withdrawing all attention from outside and direct it to the study of one's own Breath. This is the first step in our long journey into the inner-most recesses of our own self, where resides bliss and happiness.

When the attention is focussed how the Breath comes in and out, whether it is shallow, deep, whether inhalation times are equal, one studies very gross forms of change within us. More we direct our attention to the study of our own Breath, more we experience the changing patterns of our own breathing from morning to evening and from day to day.

Next step would be to feel the Breath on our inner nostrils and triangular part on our upper lip. Incoming breath is colder than the outgoing one and due to non-observation-non-direction of our attention to inner workings, our ability-sensitivity of our skin inside the nostril and on the outer skin of the upper lip has become dead. By slow and perseverant effort, this sensitivity is regenerated and it is the aim of Vipassana to bring back this sensitivity.

Next step is to focuss attention on the outer skin of the body and watch sensations due to changes in our inner workings, study and experience its changing patterns and the positive, purifying and benevolent role that a neutral observation plays in watching these changes. Once the sensitivity of outer skin to changes occuring within us is established by repetitive participation in 10 days camps, first task of Vipassana meditation is achieved.

Having regenerated the sensitivity of the outer skin to the changes within, the next exercise involves shifting of our attention from one limb to other covering all parts of the body from Head to Feet and in order one after the other.

In the beginning, one will feel difficult to concentrate attention and shift it and that too in order. My personal experience is that some skill in this exercise starts getting developed from the third camp, first two serving to prepare the mind for the success in the third. It is sufficient to say that with continued effort it is possible to concentrate and also shift the attention in a concentrated way. It is advisable that a beginner whose concentration is not established, should attend if possible one camp every four months. Now the stream of consciousness moves throughout the body similar to blood stream but unlike it in so far as, it is immaterial in Nature. It is connected with motor and sensory nerve centres in the Brain.

Negative emotions like Hatred, Jealousy, Anger, Greed, Violence etc. are stored in this reservoir (Sub-conscious mind) and only come out when some external situations give a spark. If the stored-up level is more, it surfaces out with a trivial spark. otherwise a longer duration of disagreeable situation or a severe intensity of the spark is required. During Vipasana when external stimulus of any kind is artificially stopped, concentration is directed inwards, in other words when one surrenders to Mother Nature, the kind Mother starts washing her child-ridding him of all defilements-negativities-impurities, because only function of nature when left to itself is to make impure things pure, dirty things clean, unhygenic to hygenic etc. Only condition required is that student during those ten days is not required to do anything whatsoever to disturb Nature from working. Whether sitting or sleeping, his only task is just to see what happens on the body without disturbing the happening in any way.

Process of Purification manifests itself in the body or its outer surface in following ways :

1. Burning sensation on the skin partially or throughout the body.
2. Excessive perspiration.
3. Excess movement/shaking of Hands, feet, head, chest etc.
4. Weeping, crying, shouting etc.
5. Pin-pricking, throbbing, pulsating, crawling of an insect etc.
6. Changes in breathing pattern, growing from slow to very vigorous.
7. Many more not described here.

Few of these sensations may remain after the camp is over. Generally they manifest when one relaxes or is alone.

All these sensations are Nature's Purification processes and successive camps should be attended till these sensations either subside or become very moderate.

At the end of every Vipassana camp, Nature having done her job, leaves her child purer than what he/she was at the start and the result of the purity is inner strength– equanimity, calmness, serenity, freshness, development of insight into day to day work, joyfulness, sweetness etc. All harsh lines on the face start disappearing, face becomes bright, speech becomes more harmonious, loses its sting, temper becomes steadier and behaviour becomes more polite, less prone to excitement and more coherent in family and society. There are lesser quarrels, bitterness, strifes, tensions-this negativity in behavionr giving place to Love, benevolence, co-operation, patience, toleration and all those qualities which make human nature positivc and constructive to all Real-life situations -- be it in family, in job, in business, in society, anywhere and everywhere. Such beautiful are the gains of this practice. One has nothing to lose except his chains of Negativity and weakness to be exchanged for positivity and strength.

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Yoga Mimamsa Vol. XXVIII, No. 1. pp. 49 to 52. April 1989.

Mental Health and Yoga*

*B. Ramamurthi***

Abstract :

Being an eminent person in the field of neuro-surgery, the author has described succinctly the contribution of yogic practices towards the preservation of mental health and prevention of various types of mental illnesses prevalent in our modern society,

The supreme role played by yogic practices in the maintenance of mental health and efficiency has been known to mankind for many centuries. In fact, it can be stated without any doubt that yoga is the most important contribution by Indian culture to mankind. The entire fabric of Indian culture over the past many centuries has been woven around the concepts of yoga inspite of many trials and tribulations undergone by the country during some periods of its history.

Higher levels of yoga :

The relationship between yoga and mental health can be viewed from three points of view. One is the aspiration of mankind to transcend the bonds of its environment and to rise to great heights of bliss and joy unalloyed by fear, sorrow etc. its ultimate aim being the merging of the individual consciousuess with that of universal consciousness. with that of universal consciousness. During the progress towards such a supreme ideals, the practitioner of yoga may develop powers which cannot be explained by presently known scientific laws. We are not deeply concerned with these higher levels of mental evolution in this presentation.

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* Keynote address delivered at the Second Annual Conference of the Indian Academy of Yoga at Madras on January, 1983.

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The General run of humanity :

The second and the most common group is the majority of mankind who seek solace from the travails of everyday life, with all its burdens and tensions. Apart from external and environmental factors, one's own nature or guna also determinate the mind's response to events. While some are able to face problems with equanimity, many persons are not endowed with such a nature and in consequence suffer from the effects of internal and external tensions. It is obvious that the majority of mankind do not possess mental equilibrium or equanimity. On the contrary the mind continues to oscillate extensively without experiencing peace or tranquility for any length of time. To such persons yogic practices are indeed a great boon, gradually leading to proper mental equilibrium accompanied by peace and joy. In such a state these persons are able to face problems easily and perform their duties and functions efficiently and with the least friction.

Therefore, it is obvious that if yogic practices become wide-spread and are adopted by the majority of mankind individual tensions will disappear eventually leading to lessening of friction and unrest in the society, in the country and all over the world. The recent interest and enthusiasm shown by citizens from many countries of the world towards the practice of yoga is sufficient evidence to stress that yoga is the unquestioned pathway to individual and world happiness. This is the great aim of yogic teachers who proclaim Lokāḥ Samastāḥ Sukhino Bhavantu.

Mental ill–health :

There is a third group of persons who require help, those who suffer from mental ill health (psychiatric illness). Such illnesses are not uncommon and cause great distress to the patients and sorrow and unhappiness to the relatives. Mankind's attitude to such mental illness has been one of awe and fear, invoking theories of action of supernatural forces, demons etc. Having no concept of the origin of mental illness mankind has treated the mentally ill with callousness and cruelty. During the last century, our knowledge about the causation of psychiatric illnesses has become clearer and with our great understanding of our brain function, the cause of mental disturbances is gradually becoming apparent.

In the modern day, it becomes necessary for us to examine whether our great science of yoga can in anyway help the unfortunate individuals suffering from psychiatric illness. Recent investigations into yogic states have shown that yogic practices do change for the better electrical and chemical activity of the brain. Therefore, there should be possibility that specific yoga practices can help in mental illness.

Patients suffering from mental illness do not have the basic drive or motivation or even the capacity to adopt therapeutic measures. Yogic practices and exercises that can easily be performed and would be acceptable to persons suffering from serious mental illness could be identified and made known to the public and physician alike. This will indeed be a boon to the afflicted.

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Yoga Mimamsa Vol. XXVIII, No. 1, pp. 53 to 57. April 1989.

Yoga as a prophylactic Health Care

*Dr. V. Anantharaman**

Abstract :

While strongly recommending the yogic exercises for maintaining a state of equilibrium between body and mind, the author pin-pointedly describes important psycho-physiological developments found in 20 subjects who underwent Hath-yoga training.

In the present day context yoga may be considered as a system or discipline of Yoga Asanas (Postures), Pranayama (controlled breathing patterns), Kriyas (cleansing processes) and Meditation by which one can withdraw oneself from the extraneous stimuli and maintain a state of equilibrium between body and mind.

Yoga produces a HYPOMETABOLIC or relative ANABOLIC state with parasympathetic predominance. This represents RELATIVE QUIESCENCE, rather than the HYPERMETABOLIC or CATABOLIC state of the sympathetic predominance which represents RELATIVE URGENCY AND MASSIVE ACTIVITY. It is the balance between the two, that determines what we are, at a particular moment. A careful study of Patanjali's Yoga sutras clearly indicates that Yoga treats the body and mind as a whole. Hatha Yoga Asanas and Pranayama condition one's body and mind to a relaxed state.

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**Lecture delivered at the 99th Birth anniversary of Swami Kuvalyananda celebrated as scientific yoga day by the Scientific Yoga Health club, of Kendriya Vidyalaya. I. I. T. Madras on 30-8-82

Twenty subjects who subsequently underwent Hatha-Yoga training had their physiological parameters assessed before the starting of the training and at the end of first, third and sixth month of the period of training, thus they themselves formed their own rigid controls.

Hatha Yoga training was found to reduce the resting core temperature during a standard submaximal exercise to a minimum by its improved thermoregulatory adjustments. The increase in peripheral blood flow as a result of exercise showed similar pattern as observed by earlier workers. However, in about three months of Hatha yoga training, this increase had lessened with concomitant increase in the extraction of oxygen, showing thereby an increased adaptation by Hatha yoga training. Thus it induced the body tissues to extract more oxygen per unit blood flow.

Hatha yoga training increased the threehold of excitability of the muscles involved and brought about their quicker relaxation. This helps in warding off minor external unwanted stimuli as seen in trained yogis. The improved propogation of impulses in the motor nerve may possibly explain the quicker reflexes observed in persons trained in Hatha-Yoga.

The anthropometric studies reveal that Hatha Yoga training in general helped individuals to achieve their optimum weight approximately 58 Kgs. There was demonstrable decrease in subcutaneous fat. The gain in weight inspite of fat loss therefore could only result from increased muscle mass.

From the pulmonary function tests it is inferred that the Yoga training increases the expiratory efficiency, respiratory muscle power and decreases visco-elastic resistances. It also increases the pulmonary efficiency and enables the person to attain an optimal maximum level of ventilation.

The polygraphic studies of respiration, E. C. G., E. E. G., E. M. G., and blood flow (finger and wrist) showed that respiratory rate is decreased by Hatha Yoga training whereas the respiratory amplitude and peripheral blood flow both in the finger and wrist increased due to the training and during the performance of asanas. The increased peripheral blood flow after training has been attributed to the reduced sympathetic tone. In Shavasana the EMG activity is negligible and heart rate and respiratory rate are minimum and peripheral blood flow is good. This represents completely relaxed state of the body and as such it is recommended for the treatment of hypertension.

Yoga has its own way of strengthening the weak parts of the body. The panting and sweating that accompany the sternous athletic exercises are conspicuous by their absence. Instead, Yoga provides a pleasurable feeling during and after exercise, completely eliminating the need for a recovery period. The joints of the body which become inefficient due to constant disuse can be rehabilitated by passive stretching exercises. A wide variety of flexion and certain types of constriction are involved in Yoga asanas. Further the unusual postures initiate diversion of blood flow and cause other physiological adjustments. The breathing exercises also seem to complement the physical exercises and aid in bringing about certain physiological change for better health.

In Yoga training, while the body is exercised, the mind is kept calm and concentration on a pre-determined thought is practised. The effectiveness of this sort of double pronged attack was felt by the yogis of bygone years, and it has been tested again aud again. It is believed that the mental poise facilitates physiological development, and the two together enable the practitioner to discover his or her potential abilities and experience some sort of inner happiness. Thus, we find that yoga has unique characteristics and modern man can draw much benefit from it.

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Yoga Mimamsa Vol. XXVIII, No. 1, pp. 58 to 59 April 1989.

YOGA Bioenergy and Health

Prof. T. M. Shrinivasan

Abstract :

The author has attempted to show the relationship of the healthful gains of yogic practices with Bioenergy which is associated with the human body, human mind and spirit.

Yoga, in Indian context, may be defined as **Karmasu Kausalam**-perfection in action as enunciated by Lord Krishna to Arjuna. It is yoking the body and the mind (at the physical plane); yoking the mind and the spirit (at the mental plane) and the Universal Consciousness (at the spiritual plane). Since Yoga unifies the psychic and somatic (bodily) functions, mental and physical integration and health is achieved by the practitioners of yoga.

The entire universe may by classified into two forms of energy-mass and radiation. These two forms are interconvertible into each other, as per the famous equation of Einstein. The current evolution theory suggests that the initial dense condensation of matter expanded and radiant energy emanated from it as matter was dissipated. All kinds of matter has radiant energy associated with it and as we know, radiation is a particular aspect associated with matter. These energies are known as akasa (matter) and prana (radiation) respectively, in the ancient Indian Yogic texts.

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* Lecture delivered at the 99th anniversary of Swami Kuvalayananda, celebrated as Scientific Yogaday by the Scientific Yogic Health Club of Kendriya Vidyalaya, I. I T., Madras on 30-8-1982.

The biological world has energy due to the material forms as well as that due to life forces. The Bioenergy is reflected and intimately connected with the life forces even in the smallest organism. Thus, both sentient and insentient world has both akasa and prana associated with it. The bioenergy flows in a human, in many channels crossing at numerous energy points. These energy points have lowered electrical-resistance as well as lowered radiation-resistance. Indeed, the acupuncture points, many of which correspond with chakras, can be detected by finding out the low resistance encountered on the skin as a current probe is moved over the body. It is possible to take photographs of this bioenergy by a method developed in Russia known after its inventor, Kirlian. The photo is taken of the object while it is subjected to a high frequency, high energy radiation which interacts with the bioenergy resulting in a discharge. The quality of bioenergy in the organism is recorded. Experiments conducted here have shown that the intensity and colour of radiation from the finger tips depends on the health status of the individual. Thus, the same person under meditative and non-meditative states exhibit different colour patterns. Similarly, sick individuals have completely different patterns. It is possible-though right now premature-to classify the healthy and the sick through Kirlian photography. However, what is of interest presently is the evidence, that there is bioenergy or prana in every living being and that this may be recorded unequivocally by some instrumental means.

Yoga tends to stabilize the flow of this bioenergy to all parts of the body. Since bioenergy is associated with the entire human-including body, mind and spirit, good psychosomatic health is experienced by practitioners of Yoga. Thus yoga is an appropriate, inexpensive method of regenera ting bioenergy to attain good health.

Yoga Mimamsa Vol. XXVIII, No. 1, pp. 60 to 64. April 1989.

Yoga for Health*

Dr. S. Subramanyam

Abstract :

The beneficial aspects Yogic practices including the specitic healthy effects of some asanas have been very lucidly summarized and recommended for the preservation of health and amelioration of psycho-somatic diseases of all types of modern men.

Yoga is an ancient Indian culture. Its philosophical and metaphysical aspects may be accepted, or denied but there can be no doubt about its rewards in the form of better health, vitality and psycho-social poise. Derived from the Sanskrit word YUJ, yoga literally means union-union of the body and the mind.

It is strange yet true, that yoga, a discipline developed in India thousands of years ago has been all but forgotten in the land of its birth. The root is hidden deep in the bowels of India but the branches are getting more and more widespread in the west. It is high time that we start on our voyage of discovering the incalculable, wonderful and beneficial effects of yoga.

Yoga is a system of physical and psychical control which makes the practitioner aware of the identity of Atman. Patanjali provides us with a methodological process for achieving the benefits of yoga by practising the 8 steps, commonly called the Astanga yoga. These are Yama (Control and discipline), Niyama (Rules, methods and principles) (Asana (posture) Pranayama (Breath centrol) Prathyahara (withdrawal of mind from external world), Dharana (Concentration) Dhyana (meditation) and Samadhi (contemplation). All these 8 steps are contained in Jnana yoga, Karma yoga, Hatha yoga and Raja yoga. Hatha yoga is the most practical of all the yogas. It emphasises the promotion of vibrant health by tapping the organism's latent energies. It has a calming influence on mind. It is not merely the absence of sickness that is good health. A sound and dynamic body, a strength generating appearance and a power symbolising firmness–when all these are present together good health results. Yoga has now been recognised not only as a routine practice for general well being, but also as a therapeutic agent for certain diseases.

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* Lecture delivered on the centenary birth anniversary of Swami Kuvalyadhama celebrated as 2nd Scientific Yoga day by the Kendriya Vidyalaya scientific yoga health culb of the IIT Madras on 30-8-1983.

Let us now take a bird's eyeview of some of the modern diseases and the effect of yoga on them. Several bodily and mental disorders are caused by stress. Tension hovers round milllons of people like an ugly vulture ready to swoop down at any time and at any place. In modern parlance such diseases are called Psycho somatic disorders (psycho=mind, soma=body). These are closely interlinked and a disorder in one system can cause disturbances in the other. Depending on the susceptibility of the individual and the environment, we have various stress induced diseases namely, high blood pressure, bronchial asthma, diabetes, thyrotoxicosis, gastric ulcer etc. Stress can also produce behavioural disorders like aggression, depression, neurosis, epilepsy, schizophrenia, drug addiction etc. These can be caused by an imbalance in hormonal secretions as well as of the chemical substances produced in the brain–the neourotransmitters and a re–establishment of the balance can alleviate these conditions.

Hatha yoga is the science of bodily excellence. It brings about physical fitness by improving the vital functions.

Some of the basic yogasanas are Padmasana and Vajrasana. They provide stability for other postures. Halasana (Slough like posture) enables one to stretch the body; it improves circulation and also stimulates the endocrine glands. Matsyasana (fish like posture) strengthens the vertebral column and helps expansion of the chest. Sarvangasana (ahoulder stand posture) is useful for thyrotoxicosis and ailments of head and neck. Bhujangasana (cobra posture) has specific effect in women for various menstrual problems. Dhanurasana (bow-like posture) in which the whole body is stretched to improve breathing and the pumping action of the heart. Suryanamaskars stimulate the endocrine glands. Shalabhasana (butterfly posture) gives flexibility to spine, and invigorates the muscles of the eye, face, neck and shoulders. Trikonasana increases visual power and mental attentiveness. Ardha-Vakrasana corrects constipation, and stomach troubles. The yoga mudra is benefical for gastric troubles and enhances sexual potentiality. Shavasana (corpse like posture) brings about complete relaxation of all the muscles of the body. This asana is a remarkable Kriya for relief of high blood pressure. It is not a single asana that cures a disease but it is a combination of several asanas that is beneficial.

The brain is the most mysterious organ in the human body. The brain has billions of nerve cells and innumerable connections amongst them. The brain functions as a great nerve centre of receiving, recording and responding. The tiny thinking cells of the brain are the neurons and they require a continuous oxygen supply. If oxygen is deprived for 3 minutes they will be damaged and if deprived for 20 minutes they die. Brain cells are not replacable. Regular loss of cells leads to premature ageing, loss of memory, reduction of sensual acuity, of coordination and power to reason.

In this physical body there are 2 forces which are in constant balance with each other. One is the mind by which you think. The other is the force of life by which you live and move. If there is no life or mind, you can imagine what will happen to the body. The physical body does not move on the basis of brain, heart, lungs, hands or feet. After all a dead man has all these. The body lives on life force which is not the air you breathe but it is the bioplasm. If there is no life force everything would disintegrate. This life force is known as prana. If there is no mind, you cannot see even though you have eyes. In the physical body a balance must be maintained between the two forces.

Yoga brings about increased cardiopulmonary efficiency, relaxation of the muscles, decrease in the amount of oxygen consumed, and equal distribution of energy in the body and it maintains the neuro-endocrine balance, thus bringing about equilibrium between the body and the mind. Yogasanas act on the mind through the body whereas meditation acts on the body through the mind.

It is well known that practising yogis seldom have illnesses and live a long and productive life. In this modern world full of trials and tribulations, it is imperative that yoga is practised for the achievement of a happy and contended life. Yoga is perhaps the only answer to most of the psychosomatic illnesses of today.

For a healthy society with its members contributing their best for the development of physical, mental and moral values, it is important that yoga is practised. There is a misconception that yoga is part of Hinduism and it is only for the old people. Nothing can be further from the truth. Yoga and meditation have nothing to do with any religion. They can be practised by both men and women. Nor is it only for the old. They are as much for the affluent as for the poor, for the young as for the old.

It is not only for health that people need yoga. Everyone is trying to express himself better, whether he be a painter, carpenter, businesaman, tradesman, doctor or lawyer. Yoga has become one of the more recognized aids for developing this creative intelligence.

So learn to train your mind and body in the benefical secrets of yoga and gain an inner peace that will be yours for the rest of your life. Add years to your life by freeing yourself from the wear and tear of stress and tension caused by the anxious life we live in.

Yoga has a complete message for humanity
It has a message for the human body
It has a message for the human mind
It has a message for the human soul.

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Yoga Mimamsa Vol. XXVIII, No. 1. pp. 65 to 72. April 1989.

Haematological, Biochemical and Ventilatory Responses to the Practice of Yoga in Adults

*Dr. K. C. Khare**
*Dr. V. C. Sanghvi***
*Dr. D. C. Surana****

Abstract :

A group of 25 healthy adults who were performing YOGA and age-matched controls were compared in this study. The examination included biochemical, haematological and ventilatory function tests.

Slowing of pulse rate, corrective improvement in haematological values, significant decrease in blood sugar with increase in plasma protein specially albumin were noted in this study. Mid expiratory flow rate was found to have appreciable improvement in majority of the patients.

Introduction :

YOGA is an ancient Indian cult and way of life, which is claimed to endow one who practises it with perfect physical, mental and spiritual health. Yoga has been practised in India for more than 2000 years. The Yogic postures appear to have been devised specially to

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influence and rehabilitate the vital organs without muscle fatiguability. Yogic asanas have been shown to have significant improvement in pulmonary functions, expansion of chest and breath holding time. Keeping this point in view this study has been undertaken in this centre to assess clinical, biochemical, haematological and ventilatory responses to the practice of yoga.

Materials and Methods :

The present study comprised of 25 healthy adults performing regular yogic practices. Their age-group ranged from 18 to 50 years. A control group comprised of 5 cases who were not performing yoga.

Physical examination was done in all the cases which included body weight, chest measurements during inspiration and expiration and breath holding time. Ventilatory function tests were recorded by Toshniwal spirometer and Wright's Peak flowmeter. The pulmonary function tests included tidal volume, inspiratory capacity, forced expiratory volume in 1 sec., maximum voluntary ventilation and peak expiratory flow rate.

Haematological study comprised of complete haemogram and biochemical examination included fasting blood sugar, blood urea, serum cholesterol, S. G. O. T., S. G. P. T., X-ray and E. C. G. were done in all the cases prior to to the practice of yoga.

Various yogic asanas were performed daily in the morning from 6 A. M. to 7 A. M. at Geeta Bhavan Yoga Centre. The Yoga exercises included :-

1. Prayer ... 2 minutes
2. Surya Namaskar .. 5 minutes

3. Sharir Sanchalan .. 6 minutes
4. Asanas .. 20 minutes
5. Pranayama ... 15 minutes
6. Dhyana .. 15 minutes.

Observation :

In the control group, out of 5 cases, 4 were male and 1 female. In the yoga group, all the cases had been male sex. In both the groups, the age ranged from 16 to 45 years.

TABLE - I

Physical Examination in Both Groups

Sr. No.	Subject	Control			Yoga.		
		I Mean C̄ S. D.	II Mean C̄ S. D.	P Value.	I Mean with S. D.	II Mean with S. D.	P Value
1.	Pulse	78 ± 11.27	75. 2 ± 4.78	∠0 3	79.35 ± 9.63	75.2 ± 6.88	∠-0.05
2.	Weight	49.76 ± 3.17	50.4 ± 3.4 ±	70.4	69.96 ± 12.3	62.45 ± 11.06	∠0.4
3.	Chest girth	80.2 ± 2.92	81.4 ± 3.13	70.3	87.15 ± 7.71	90.00 ± 7.83	∠0.1
4.	Chest Expansion	3.6 ± 0.48	4.2 ± 0.74	∠0.3	4.25 ± 1.44	4.3 ± 1.48 ±	∠0.4
5.	Breath Holding Time.	44.0 ± 10.19	54.0 ± 14.62	70.2	54.2 ± 18.29	55.02 ± 17.52	∠0.4

The above table shows that pulse rate was significantly reduced in the yoga group as compared to control group. (P. value ∠0.05).

TABLE II

Ventilatory Function Test in Both Groups.

Sr. No.	Subject	Control			Yoga.		
		I Mean with S. D.	II Mean with S. D.	P Value	I Mean with S. D.	II Mean with S. D.	P Value
1.	V. C.	3.03 ± 0.421	3.144 ± 0.453	70.4	2.952 ± 0.602 ±	3.067 ± 6.370	70.3
2.	FEV 1	2.67 ±	396.4 ±	70.2	252.9 ±	350.4 ±	70,3
3.	MEFR	297.6 ± 123.9	396.4 ± 117.38	70.2	252.9 ± 98.91	350.4 ± 108.19	7.005
4.	MME-FR	202.6 ± 64.14	277.1 ± 87.499	∠0.1	201.2 ± 70.31	230.4 ± 73.36	∠0.1
5.	MVV	86.82 ± 27.73	109.4 31.55	70.2	91.62 ± 30.93	104.6 28.93	70.1
6.	PEFR	508.4 88.4	536 ± 79.39	∠0.4	492 ± 82.37	514 ± 83.21	∠0.2

The above table shows that maximum expiratory flow rate was significantly increased in yoga group as compared to control after 3 months of the practice of yoga.

('P' Value 70.005). Maximum expiratory flow rate also shows improvement in yoga group. ('P' value /_0.1).

TABLE III

Hemogram Study Observations

Sr. No.	Subject	CONTROL I Mean C̄.S.D.	CONTROL II Mean C̄.S.D.	CONTROL Effective 'P' value.	YOGA I Mean C.S.D.	YOGA II Mean C.S.D.	YOGA Effective 'p' value.
1.	Hb.	13 ± 1.26	13.6 ± 0.73	∠0.2	13.8 ± 0.97	14.32 ± 1.14	∠0.05
2.	P.C.V.	42.8 ± 2.78±	43.0 ± 2.09 ±	∠0.4	43.7 ± 2.43	45.1 ± 2.48	>0.85
3.	T. R. B.C.	4.52± 0.55	4.72 ± 0.30	>0.3	4.82 ± 0.33	4.96 ± 0.29	>0.1
4.	T.W. B.C.	7540± 739	7560 ± 1194	∠0.4	7365 ± 1782	7640 ± 1477	∠0.05
5.	E.S.R.	8.8± 4.4	9.0 ± 1.09	∠0.4	11.15 ± 6.96	7.76 2.39	∠0.025

The above table shows that Hb, P. C. V., Total R. B. C. count and W. B. C. count had improved in yoga group which is also statistically significant.

TABLE IV

Shows Haemogram study observation in both the groups.

Sr. No.	Subject	I Mean C̄.S.D.	II Mean C̄.S.D.	'p' Value	I Mean C̄.S.D.	II Mean C̄.S.D.	'p' Value
1.	Blood Sugar	63.8 ± 3.37	61.6 ± 7.83	>0.3	61.41 ± 2.35	52.58± 11.51	
2.	Serum Cholesterol	160.8 ± 13.89	169.2 ± 12.49	∠0.02	166.2 ± 25.92	190.4 ± 26.63	
3.	Serum Proteins	5.76 ± 0.28	6.04 ± 0.28	>0.1	5.76 ± 0.48	6.05± 0.52	
4.	Serum Albumin	4.2 ± 0.54	4.4 0.41	∠ 0.3	3.85 ± 0.34	4.24± 0.35	

Discussion :

From the foregoing observations, one can notice changes in biochemical, haematological and ventilatory function tests in normal persons performing yoga. The slowing of pulse rate is quite evident and is statistically significant. Our findings are in closed conformity with the studies of ANAND AND CHINNA (1961), UDUPA(1975), NAYYER (1975), and NĀYYAR, H. S. (1981). This slowing of pulse rate is thought to have been brought out through the effect of yoga on autonomic nervous system (Leo, 1970) and mediated through limbic system (Anand et al, 1961). The slowing of pulse rate is in sharp contrast to muscular exercise.

There was increase in the chest circumference in all the cases which range from 1 to 8 cm. Similar were the observations seen by UDUPA (1972; 1975).

Biochemically fasting blood sugar values showed decrease in blood sugar levels after the practice of yoga which is statistically highly significant (P. Value less than 0.005). This might be due to increased peripheral utilization of glucose during the practice. Similar were the observations by UDUPA et al (1975).

Serum protein showed significant rise specially of its albumin component. This findings are similar to that of UDUPA et al (1972-1975). The increased anabolic activity of body brought about by yoga could be responsible for this.

Haematological values e. g. Haemoglobin, packed cell volume, Total W. B. C. component showed remarkable improvement after the practice of yoga. An orderly muscular activity brought about by yoga may be responsible for this. The work done by Bhole and Karambelkar (1971) by far agree with the above finding except total W. B. C. count.

Ventilatory function tests especially MEFR showed significant improvement in 65% cases. There is a paucity of available study on these aspects of pulmonary function tests. ASANA & PRANAYAMA by their variable muscular contraction–effect on the diaphragm could decrease the anatomical dead space and thus increase the value of M. E. F. R.

Maximum Mid Expiratory Flow Rate and Peak Expiratory Flow Rate showed improvement in their values but were not stastistically significant. Hence for the study of MEFR & P.E.F.R. study on large scale may be needed to assess these functions in detail.

Thus, this study clearly shows that yoga is not a muscular exercise. Biochemically there is definite improvement in persons doing yoga. Haematologically these cases have shown significant improvement in their blood picture. Ventilatory function shows beneficial effect in maximum expiratary flow rate. These improvements could be due to effect of yoga on autonomic nervous system mediated through the limbic system.

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Yoga-Mīmāmsa

Vol. XXVIII July 1989 No. 2

EDITORIAL NOTES

May the maker of all make this journal a success. Blessed is the name of the Lord. May He bless the workers of the Ashrama with a happy and prosperous career as servants of the world which is only the Lord Himself objectified, May He, that has created us in His infinite wisdom, lead us to the light that is beyond all darkness.

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In the article 'Effect of meditations and pranayamas in promoting homeostasis in normal individuals', Dr. T. Desiraju, an internationally recognised neuro-physiologist working at NTMHANS, Bangalore has pointed out that "the patterns of changes observed due to yoga practice in each individual were considered to be reproducible with certain probability,..... ...the patterns of changes were different for each subject, even under a given yogic method"

These observatios will have to be taken into consideration by other research workers working in this field.

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In the article, 'Lateral dominance and preformance of selected yogic postures', Dr. M. L. Gharote has concluded that the position of the hand in Padmasana; the position of upper leg as upper hand in Gomukhasana in the case of males showed relationship with lateral dominance while no such relationship was established in respect of movements involved in Padmasana and Gomukhasana in males and females.

In the article 'A critical note on Hathapradipika', Dr. Gharote has presented his observations based on the study of 101 Mss. and several printed editions in respect of number of verses, topics dealt in different editions and list of asanas. The article is bound to find an important place amongst Various studies related with Hathapradipika

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Dr. Gharote has presented the topic of Asana in relation to its meaning, scope, characteristics as a seat, kinds of seat, asana as a posture, definitional analysis of asana, multiplication of asanas, asanas as physical cxercises, and asanas in physical education currsculum in a very lucid manner in his article, 'Asana : A historical and definitional analysis'.

+ + +

The article, 'Sandhi, Samadhi and Vyadhi--Some considerations' by Shri Mahesh Dave and Dr. M. V. Bhole presents a new interpretation, relating the terms, 'Samadhi and Vyadhi' appearying in P. Y. S. (I : 20, II :2, II 45, I : 30) with the term 'Sandhi' found in Vedic literature. They have made an attempt to study Vyadhi as an antonym of Samadhi and not as a disease related to the physical body. Usually the latter meaning is given by various commentators. They have also tried to differentiate between the roots 'dhā' and 'dhi' as 'a process' and as 'a state' respectively,

+ + +

Lyubomir Lakhchev has emphasised the importance of asanas, pranayama and kriyas as physioprophylactic measures which could be practiced during rest and hiking in holidays by European people in the article, 'Role and plaee of primary mass physioprophylaxis in improving the effectiveness of rest and hiking.

The articls has becn reprinted from the collection of diploma paper abstracts, holiday activities, Sofia, 1986.

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The articte, 'Food and behaviour' by Dr. M. V. Rajapurkar describes

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May the Lord give us strength to carry on this work. May He ever widen the circle of our sympathisers and thus allow us to serve His Children to the best of our ability.

+ + +

In the article, 'Food and Behaviour'; Dr. M. V. Rajapurkar has tried to integrate the influence of food on mind as propounded in ancient Indian literature and the findings of the modern medical literature on the effect of food constituents, specially of amino acids, on neurotransmitters leading to the activity of the selected areas of the brain, thus resulting in the modification of the behaviour of the individual. He has given a number of references from both the systems to autheticate his conclusions. The whole article must be read carefully to understand the subject properly.

Date : 21st July, 1989

The article has been abstracted from the collection of science paper abstracts, [illegible] sciences, Sept. 1962.

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The article "Food and behaviour" by Dr. M. V. Rajapurkar describes

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May the Lord give us strength to carry on this work. May He ever widen the circle of our sympathisers and contributors to serve His Children to the best of our ability.

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In the article "Food and Behaviour", Dr. M. V. Rajapurkar has tried to integrate the influence of food on mind as propounded in ancient Indian literature and the findings of the modern medical literature on the effect of food constituents, specially of amino acids, on neurotransmitters leading to the activity of the hypothalamus and the brain, thus resulting in the modification of the behaviour of the individual. He has given a number of references from both the systems to substantiate his conclusions. The whole article must be read carefully to understand the subject properly.

[illegible], 21st July, 1980

Yoga Mimamsa Vol. XXVIII, No. 2, pp. 1 to 3 July 1989.

Effect of Meditations and Pranayamas in promoting Homeostasis in normal individuals

*T. Desiraju**

Abstract :

Laboratory experiments on 73 yogic practitioners belonging to different schools of yoga revealed significant psycho-physiological changes in the processes related to homeostatis of subjects.

We have been intensively investigating 31 senior subjects and also 42 new entrant subjects belonging to different schools of yoga practice, including Transcendental Meditation (TM), Brahmakumaris Raja Yoga meditation (BK), Yoga Nidra (Bihar School of Yoga). pranayama types of Bhastrika, Ujjayi, Nadisuddhi, Suryabhedana, and also some special individual categories of meditations, using the methods for recording and analysis of EEG, cerebral evoked potentials (somatosensory, auditory and cognitive), EKG, GSR, respiratory functions, finger plethysmogram, oxygen. consumption, urinary HVA, MHPG, VMA, 5 HIAA, 17-ketosteroids, blood cortisol and lactate, and psychological tests to detect changes of personality and self-actualisation.

The results (ref 1-6) revealed that significant changes occurred in the subjects during the periods of practice of the respective yogic procedures mentioned

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above, compared to pre-yogic baseline values of each subject. The changes of yoga sessions were further compared with the changes of control sessions without doing yoga (just sitting), but otherwise similar in other respects to the yoga sessions. Moreover, yoga sessions ar well as the control non-yoga sessions of each subject were each repeated atleast three times, and statistical evaluation of significant changes occurring in each of these six sessions were made, to finally deduce the net effects of yoga. Hence, the patterns of changes observed due to yoga practice in each individual were considered to be reliable and reproducible with certain probability. It was very interesting to note from such a controlled study that the patterns of changes were different for each subject, even under a given yogic method.

In view of the large enough number of subjects so far studied, using a wide range of parameters of different physiological systems of the body as mentioned above, the above stated observation of individual-related patterns of significant changes is of great scientific significance, as it indicates that yogic procedures influence processes available in the mechanisms of homeostasis of the subject, thereby perhaps facilitating to actualise the physiological potentialites or bringing them into habit or making available for use when required in the subject. In other words, the uniqueness of yogic procedures seem to lie in the scope of their impact in influencing changes harmoneously according to the uniqueness and plasticity of physiological systems of each individual.

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Yoga Mimamsa Vol. XXVIII, No. 2. pp. 4 to 16. July 1989.

Lateral Dominance and Performance of Selected Yogic Postures

Dr. M. L. Gharote

Abstract :

The author has attempted to study scientifically the relationship of laterality to performance of Padmasana and Gomukhasana.

Introduction :

Several studies on laterality associated with speech reading, writing, behaviour problems and motor performance have been reported in the literature. The results of these studies have shown various degrees of association between laterality and performance, but the conclusions have not been clear.

With the persisting interest of the investigator in the teaching of yogic exercises like Asanas (Postures), it was observed that certain individuals have a preference in using particular extremities first, while certain other individuals tend to use opposite extremities in the same yogic postures. Descriptions in the traditional texts of Hathayoga indicate a particular lateral dominance. It was thought that there might be a close relationship between the use of a particular extremity in preference and the general lateral dominance of an individual. It was a general observation of the investigator that persons having left dominance perferred to start with left leg for sitting in a cross-legged position called Padmasana (Lotus pose) contrary to the usual practice of using right leg first according to the description of the traditional texts. It was considered of interest to collect data on a number of individuals and verify this trend.

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* Paper read at the 2nd International Conference on Yoga Education and Research at Kaivalyadhama, Lonavla held from 1st to 4th January, 1988.

Purpose :

The purpose of this investigation, therefore, was to study the relationship of laterality to performance of some selected yogic postures.

Materials and Methods :

Subjects : The data were collected on 142 males and 38 females of the yoga training courses during the performance of Padmasana and on 70 males and 6 females during the performance of Gomukhasana.

Test : The laterality dominance of the subject was decided on the basis of Hull's Questionnaire of Laterality Test. (Hull, 1936).

Procedure : For the collection of data the subjects were individually called in the experimental room. The subject was given a questionnaire of Laterality Test to be filled in by him. He was then shown a picture of Padmasana for a period of 15 seconds and was asked to perform the same himself. While performing the Padmasana the positions of upper and lower legs as well as hands were noted on the Questionnaire Form. Then the subject was shown the picture of Gomukhasana and was asked to perform it by himself. Again the positions of legs and hands were recorded on the questionnaire.

Treatment of the data :

The questions in the Laterality Questionnaire were rated in order of dominance as follows :

0–Left
5–Equal
10–Right

The total score obtained by administering the questionnaire was grouped in the eight intervals of 50 from 0–50 to 351–400 for each subject and the frequency distribution was prepared. From the frequency distributions the first and the third quartiles were computed for males and females separately. Subjects having scores less than the first quartile were considered as having left lateral dominance while the subjects having scores greater than the third quartile were considered as having right lateral dominance. The remaining subjects were considered as having ambilaterality.

The data thus collected were analysed using Chi-square test for studying the effect of laterality on the performance of the two asanas.

Results :

The results of the analysis of data are shown in Table I and II.

It will be seen from Table I : A1 and B1 that in case of males as well as females lateral dominance and the position of upper leg are independent of each other during the performance of Padmasana, the chi-square value being not significant.

Table I : A 2 shows that in males lateral dominance and the position of upper hand are dependent during the

performance of Padmasana. It means that left dominant persons prefer to place their left hand at the top during Padmasana. In females the lateral dominance and the position of upper hand were found to be independent during Padmasana (Table I : B 2)

Table II : A 1 shows that in males during Gomukhasana the position of upper leg depends upon lateral dominance. So also is the case of the position of upper hand depending upon the lateral dominance (Table II : A2)

Table II : B 2 show that in females during Gomukhasana the position of upper leg or upper hand is independent of lateral dominance. However, the number of subjects tested is very small and therefore the results could be viewed as only suggestive.

Relationship between the positions of upper hand and upper leg. (Table III)

In Padmasana :

In Males, 83% (90 out of 91) subjects haviug left leg as upper leg and 69% (35 out of 51) subjects having right leg as the upper leg, had right hand as upper hand.

In Females, 71% (i. e. 20 out of 28) subjects having left leg as upper leg and 54% (i. e 6 out of 11) subjects having right leg as the upper leg, had right hand as upper hand. Thus there was no relationship seen between the preference of upper leg and upper hand.

In Gomukhasana :

In Males, 65% (i. e 13 out of 20) subjects having left leg as up per leg and 92% (46 out of 50) subjects having right leg as upper leg had right hand as upper hand.

In Females, 100% (i. e. 2 out of 2) subjects having left leg as upper leg and 75% (i. e 3 out of 4) subjects having right leg as upper leg had right hand as upper hand.

Thus, during Padmasana and Gomukhasana, the positions of upper hand and upper leg do not depend upon each other.

Discussion :

There is a marked lateral preference throughout the population for the use of the right hand. Groden (1969) reports that 81% of normal school children are right handed, and only 6% left handed. In the adult population the number of left-handed people may be less than that. However, the division of the population into two categories, right or left-handed, may not represent the true state of affairs. Gillies et al. (1960) described how certain subjects who wrote with their left, nonetheless perferred to use the right hand for certain other actions. They suggest that the mixed-hander is a basic biological variant. Problems bave arisen because of a failure to distinguish possible mixed from pure cases. Annet (1967) presents evidence for the value of recognition of this category. Groden (1969) following Annett's classification reports that 13% of the population of school children are true mixed-handers.

It may be that left/right differences become apparent from the first days of life. Other writers regard lateral preference as developing much later.

There is evidence also to suggest that asymmetry in motor function is associated with other aspects of developmental status.

Some authors have taken an environmentalist view supposing that cultural factors are of great importance. (Falek, 1959). Other authors support a view based on the genetics of handedness. (Annet 1964, 1967).

Traditional view holds that the hemisphere which relates to the preferred hand is the one which predominates in its functions. The evolutionary course has taken man towards asymmetry of hand perference. There are different degrees and complexities of laterality.

Some authors suggest that lateral differences can be explained by differences in the speed of neural conduction between the hemisphere and the limb. One hand functions more effectively than the other because the speed of impulses transmitted to it by the motor nerve is that much faster. Right handed subjects show faster conduction velocity in both the right ulnar and right median nerves than in the left ulnar and median nerves, whereas left-handed subjects show a faster conduction velocity in both the left ulnar and median nerves than in the right ulner and median nerves (Cress et. al. 1963). Other results could support a similar interpretation. Much could be explained by differences in the speed of nerve conduction between the brain and the hand in either the sensory or the motor nerves. The faster performing limb would be preferred, its functions more rapidly exercised and its performance more effective. It would also become more practised than the other as the effects of the choice began to operate. It could be argued of course, that differential speed of motor nerve conduction is itself a reflection of the superior status of the hemisphere giving rise to it.

It is difficult to obtain critical evidence and the problem must await further investigation. However, the view that the differences in the performances of the hands reflect the relative efficiency of the motor output is less complicated. The view of lateral preference as relating to the motor output system is relatively simple hypothesis for which much data can be advanced in support. Most of the differences observed in handedness and lateral motor preference can be attributed to separate and distinct motor output sytems on each side, which form the final route for the brain to control the functions of the hand.

Conclusions :

On the basis of the collected data the following conclusions could be drawn :

1. Both in Males and Females during Padmasana the position of upper leg and lateral dominance are independent of each other .
2. During Padmasana the position of upper hand depends upon lateral dominance. No such dependance was seen in Females.
3. In Males during Gomukhasana the position of the upper leg as well as of upper hand depends upon lateral dominance.
4. In Females during Gomukhasana the position of upper leg as well as of upper hand is independent of lateral dominance.

APPENDIX

LATERALITY TEST QUESTIONNAIRE

Name.................................... Age... ... Sex........

Grade in School........................ Present Date...........

This is a test to determine which side you use in manual activities.

In the following questions, encircle the letter R if you perform the certain activity with the right hand, L if you perform it with the left hand, and the letter E if you can perform it easily with either hand. In all of these activities, consider your hands empty when you begin to perform then.

1. With which foot do you kick a ball ? R L E
2. When you cross your legs, which one is on top ? R L E
3. When hopping on one foot, on which foot do you put your weight ? R L E
4. Which hand holds a hammer while hammering ? R L E
5. Which hand uses a can opener ? R L E
6. Which hand holds the scissors (shears) while cutting ? R L E
7. Which eye remains open when you sight with one eye though a small hole in a piece of paper ? R L E
8. Which hand distributes cards when dealing them ? R L E
9. Which hand holds the handkerchief when you blow your nose ? R L E
10. Which hand waves goodbye ? R L E
11. Which hand spins a top ? R L E
12. Which hand strikes a match ? R L E
13. Which hand winds a watch ? R L E
14. Which hand holds a toothbrush ? B L E
15. Which hand takes money from a purse ? R L E

16. Which hand holds the knife in sharpening a pencil ? R L E

17. Which hand direct the thread through the eye of a needle ? R L E

18. Which hand holds the spoon when stirring in a bowl ? R L E

19. Which hand holds the comb when you comb your hair ? R L E

20. Which hand turns the pages in a book ? R L E

21. Which hand takes the cork from a bottle of ink ? R L E

22. With which hand do you write ? R L E

23. With which hand do you use an eraser on paper ? R L E

24. Which hand cuts with the knife when eating? R L E

25. Which hand uses a salt shaker ? R L E

26. With which hand do you bounce a rubber ball on the floor ? R L E

27. Which hand is on top when you applaud ? R L E

28. With which hand do you draw a sketch or picture ? R L E

29. Which hand turns the water faucet when you hold no glass in either hand ? R L E

30. With which hand do you pick up a penny from the floor ? R L E

31. Which hand uses an eraser on the blackboard ? R L E

32. Which hand throws a ball ? R L E

33. Which hand is at the top of the handle when you sweep the floor with a straight broom ? R L E

34. Which hand holdes a tennis racquet ? R L E

35. Which hand is at the top of the handle when you rake ? R L E

36. From which shoulder do you swing a bat ? R L E

37. Which hand is at the top end of the handle when you shovel ? R L E

38. Which hand pushes the light switch on the wall ? R L E

39. Which hand puts the key in the door key-hole ? R L E

40. Which hand turns the knob in opening a door ? R L E

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TABLE - I

Lateral dominance and the position of upper leg during Padmasana

A) MALES

1. UPPER LEG

	LATERAL DOMINANCE			
	Left	Both	Right	Total
Right	9(6.9)	9(6.9)	34(38.1)	52
Left	10(12)	10(12)	70(65.9	90
Total	19	19	104	142

$X^2 = 2.64$ Not Significant

2. UPPER HAND

	Left	Both	Right	Total
Right	13(15.4)	12(15.4)	90(84.2)	115
Left	6(3.6)	7(3.6)	14(19.9)	27
Total	19	19	104	142

$X^2 = 8.03$ Sig. at 5% Level.

B) FEMALES :

1. UPPER LEG

	Left	Both	Right	Total
Right	3(1.1)	7(7.9)	1 (2)	11
Left	1(2.9)	90(19.2)	6 (5)	27
Total	4	27	7	38

$X^2 = 5.25$ Not Significant

2. UPPER HAND

	Left	Both	Right	Total
Right	2(2.6)	18(17.8)	5(4.6)	25
Left	2(1.4)	9(9.2)	2(2.4)	13
Total	4	27	7	38

$X^2 = 0.50$ Not Significant

TABLE - II

Lateral dominance and the position of upper leg during Gomukhasana

	LATERAL DOMINANCE			
	Left	Both	Right	Total
A) MALES				
1. UPPER LEG				
Right	4 (8.6)	3 (3.8)	43(37.8)	50
Left	8 (3.4)	2 (1.4)	10(15.1)	20
Total	12	5	53	70
$X^2 = 11.48$ Sig. at 1% Level				
2. UPPER HAND				
Right	7 (10.3)	4 (4.3)	49(45.4)	60
Left	5 (11.7)	1 (0.7)	4(7.6)	10
Total	12	5	53	70
$X^2 = 9.60$ Significant at 1% Level				
B) FEMALES :				
1. UPPER LEG				
Right	2 (2)	2 (2)	—	4
Left	1 (1)	1 (1)	—	2
Total	3	3		6
$X^2 = 0$ Not Significant				
2. UPPER HAND				
Right	3 (2.5)	2 (2.5)	—	5
Left	(0.5)	1 (0.5)	—	1
Total	3	3	—	6
$X^2 = 1.20$ Not Significant.				

TABLE - III

Lateral dominance and position of upper leg/hand during Padmasana and Gomukhasana

		MALES							FEMALES						
	Lateral Dominance	Left		Both		Right		Total	Left		Both		Right		Total
		No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.
		19	13.38	19	13.38	104	73.24	142	4	10.53	27	71.05	7	18.42	38
	Position of Upper Leg/Hand														
Padmasana	Right Leg	9	17.3	9	17.3	34	65.4	52	3	27.3	7	63.6	1	9.1	11
	Left Leg	10	11.1	10	11.1	70	77.8	90	1	3.7	20	74.1	6	22.2	27
	Right Hand	13	11.3	12	10.4	90	78.3	115	2	8.0	18	72.0	5	20.0	25
	Left Hand	6	22.2	7	25.9	14	51.9	27	2	15.4	9	69.2	2	15.4	13
Gomukhasana	Right Leg	4	8.0	3	6.0	43	86.0	50	2	50.0	2	50.0	—	—	4
	Left Leg	8	40.0	2	10.0	10	50.0	20	1	50.0	1	50.0	—	—	2
	Right Hand	7	11.7	4	6.7	49	81.6	60	3	60.0	2	40.0	—	—	5
	Left Hand	5	50.0	1	10.0	4	40.0	10	—	—	1	100.0	—	—	1

Yoga Mimamsa Vol. XXVIII, No. 2. pp. 17 to 28, July 1989.

A Critical Note on Hathapradipika*

*Dr. M. L. Gharote***

Introduction :

Haṭhapradipīkā is an important treatise on Hathayoga written by Svātmārāma and has commanded a great influence not only on the practical students of Yoga but also has become a source of inspiration for many later writers on Haṭhayoga as can be seen from the treatises like Yogacintāmaṇi, Haṭharatnāvali, Haṭhasaṅketacandrikā and Haṭhatattva Kaumudi. Several manuscripts of it are deposited in the oriental libraries in the country and abroad. After the first printed edition of Haṭhapradīpikā by Tukaram Tatya of Bombay in 1893, several Indian and foreign editions of Haṭhapradīpikā have come out. All these editions are more or less the production of similar text with the exception of the critical edition brought out by the Kaivalyadhama S. M. Y. M. Samiti, Lonavla in 1970. The efforts made for this critical edition are noteworthy because 101 manuscripts preserved in different libraries were consulted for this edition. This critical edition contains of 5 chapters, the last one describing the therapeutical remedies of the complaints of the Yogic aspirants as a result of faulty practices. This last chapter is not found in any of the printed edition of Haṭhapradīpikā

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* Paper read at the 1st International Conference on Yoga and Research held at Kaivalyadhama, Lonavla from 28th to 30th Dec. 1984.

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It is to be noted that different manuscripts of Haṭhapradīpikā vary in their contents. Some manuscripts contain a few verses which are not found in other manuscripts. What could be the source of the variance in these verses ?

The purpose of this paper is to invite attention of Yoga students and scholars to a unique manuscript of Hathapradīpikā preserved in the Rajasthan Oriental Research Institute, Jodhpur vide No. 6756. It contains 1553 verses divided into six chapters. It is the largest manuscript of Haṭhapradīpikā available so far which has not yet attracted the attention of the students and the scholars.

Description of the Manuscript :

The manuscript of the Rajasthan Oriental Research Institute, Jodhpur is numbered as 6756, size 17 cm. × 9 cm., pages 171, lines 7–9 and letters 20–23.

The colophon reads :

"इति श्री सहजनाथ शिष्येण श्री स्वात्मारामयोगींद्रेण विरचितायां हटप्रदीपिकायां सिद्धान्तमुक्तावल्यां षष्ठोपदेशः इति/श्रीरस्तु/श्रीमन्महाराजाधिराज श्री जयसिंहदेवजिकस्याज्ञया लिखितमिदं तुलारामेंण संवत् १७६५ वर्षें चैत्रे मासे कृष्ण पक्षे १० श्रीरामो जयति / श्री गणपतये नमः"

(Iti śri sahajanātha śiṣyeṇa śri Svātmārāmayogīndreṇa viracitāyāṁ haṭapradīpikāyāṁ siddhāntamuktāvalyāṁ ṣaṣthopadeśaḥ iti/śrirastu/śriman-mahārājādhirāja śri jayasimhadevajikasyājñayā likhitamidam tulārāmeṇa saṁvat 1765 varṣe caitre māse kṛṣṇa pakṣe 10 śrirāmo jayati/śri gaṇapataye namaḥ) There are some faults of the scribe but the text is generally correct. This manuscript comprises of six lessons containing 1553 verses. The distribution of verses and contents in each chapter as compared with the Kaivalyadhama printed edition is shown in Table–1.

The topics not found discussed in the printed edition of Haṭhapradīpikā but available in the Jodhpur manuscript are presented in Table–2. It is to be noted that the contents of the fifth chapter in Kaivalyadhama printed edition related to the therapeutical application are conspicuously absent in the Jodhpur manuscript.

In Table–3 are shown number of additional verses devoted to different topics in the Jodhpur manuscript.

Salient Points :

As has been shown the special feature of the Jodhpur manuscript is that it contains not only largest number of verses but also number of topics which are missing in printed edition.

It is worth recording some new information available in this manuscript.

Greatest number of āsanas described in any traditional text is found in this manuscript. A list of āsanas described is presented in Table–4. Eightyseven new āsanas have been described out of which names of some are quite unfamiliar and are not found in any other text. A few of these āsanas like, Śivāsana, Pūrvāsana, Saptarṣi āsana, Gorakṣa jañjāli āsana are found described by Jaiyatrama in his Jogapradīpyakā written in Hindi.

TABLE

Number of verses in each chapter of Haṭhapradīpikā

Hathapradipika Jodhpur MS.			Hathpradipika Kaivalyadhama Printed Edition		
Chapter :	No. of Verses	CONTENTS	Chapter :	No. of Verses	CONTENTS
I	177	Hathayoga-Rajayoga relationship Need of Hathayoga, List of adepts practising Hathayoga, Importance of practice according to the Shastra and as directed by Sadguru, Characteristics of a bad disciple, Need of behaviour as prescribed by Dharma.	I	67	Hathayoga-Rajayoga relationship, Characteristics of Yogic hut, Description of Āsanas, Hathayoga curriculum and Yogic diet.
II	136	Characteristics of suitable region and Yogic hut for the practice, Yogasiddhi and asiddhi lakshanas, Yama-Niyama, Curriculum of Hatha-yoga, Description of 100 Asanas, Rules of diet and contraindicated food.	II	78	Prāṇāyāma – its utility and description of 8 varieties, Description and effects of 6 purificatory processes, Description and eulogy of Kevala Kumbhaka and symptoms of the success in Hathayogic practices.
III	200	Importance and eulogy of Prānāyāma.	III	126	Description and effects of 10 Mudrās for the awakening of of Kuṇḍalini.

IV	133	Efficacy of Ṣaṭkarmas and their technique, Description of the eight varieties of Kumbhaka, purpose of Prāṇāyāma.	IV	114	Rājayoga or Samādhi by conducting Prāṇa through Suṣumnā by resorting to various techniques but emphasising on Nādānusandhāna, contribution of Śāmbhavi and Khecarī and various stages of attaining progress in laya.
V	543	Description of Kanda, three Nādis and Kuṇḍalini, Discussion on 10 Mudras with elaborate description of Khecari.	V	24	Treatment of the disorders due to erroneous Yogic practices. This topic is found only in 2 manuscripts.
VI	364	Description of various techniques of Dhyāna leading to Samādhi. Emphasis on Nādānusandhāna, Advaita, Four stages of absorptjon of mind, Internal and external symptoms and unlucky omen indicating time of death, Control of death.			
Total	1553			409	
Excess Verses	1144				

TABLE – 2

Topics from Jodhpur Mauuscript not found in the Kaivalyadhama printed edition of Haṭhapradīpikā

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1. Characteristics of Guru.
2. Characteristics of good and bad disciple.
3. Need of behaviour as prescribed by Dharma.
4. Description of 87 more āsanas in addition to 13 mentioned in printed edition.
5. Rules of diet.
6. Eulogy of Prāṇāyāma.
7. Description of Kanda, Nāḍis, Kuṇḍalinī, elaborate discussion on Khecarī.
8. Reference to Tāraka Yoga, Advaita Yoga.
9. Unlucky omens indicating death, Means of control of death.

TABLE-3

Additional verses devoted to different topics in the Jodhpur Manuscript

Chapter	No. of additional verses	TOPICS
Chapter I	110	Need of Haṭhayoga, list of adepts, characteristics of Guru, characteristics of a bad disciple, Need of prescribed behaviour.
Chapter II	58	Yama, Niyama, Description of 100 Āsanas, Rules of diet.
Chapter III	74	Importance and eulogy of Prāṇāyāma
Chapter IV	19	Description of the varieties of Kumbhaka.
Chapter V	519	Description of Kanda, Nāḍis, Kuṇḍalinī, 10 Mudrās with special elaboration on Khecarī.
Chapter VI	364	Description of Samādhi, Emphasis on Nādānusandhāna, Advaita Yoga, unlucky omens
Total number of additional verses	1144	

TABLE - 4

List of Āsanas in Haṭhapradīpikā Jodhpur Ms.

*1-2. Svastikāsana
*3. Vīrāsana
4. Agnikuṇḍāsana
5. Yoginyāsana
*6-7. Gomukhāsana
8. Turāsana
9. Kaṅkaṇāsana
10. Gandharvāsana
11. Śivāsana
12. Sāvitri-samādhyāsana
13. Maṇibandhāsana
14. Padmaprakāśāsana
15. Padmaśaṅkhāsana

27. Pūrvāsana
28. Bhiṅgāsana
29. Trimbakāsana
30. Śeṣāsana
31. Tīkṣṇāsana
32. Jaıtyāsana
33. Bhagāsana
*34. Kūrmāsana
35. Paṅkajāsana
36. Gorakṣajañjāliāsana
37. Kapilāsana
38. Kākāsana
39. Garuḍāsana

51. Pārvatiāsana
52. Ajarāsana
53. Siṁhamurgāsana
*54. Nāgaphaṇāsana
55. Brahmāsana
56. Kurkalāsana
57. Cakravākāsana
58. Vaiśākhiāsana
59. Cakorāsana
60. Koka āsana
61. Śukacakorāsana
62. Ākāśatānāsana
63. Kuhı āsana

75 Vṛścikāsana
* 76. Kūrmāsana (Uttāna)
77. Pakṣyāsana
78. Abhikāsana
79. Ajagarāsana
80. Pāradhi āsana
81. Ūrṇānabhi āsana
82. Gohi āsana
83. Kapāliāsana
84. Vṛkṣāsana
85. Tapāsana
86. Saṅgrāmāsana

16. Padmānābhabandhāsana
17. Bhairavāsana
* 18. Matsyendrāsana
19. Matsyendrapīṭhabandhāsana
20. Paśćimatānāsna
21. Kandorakāsana
22. Yonyāsana
23. Kuñjikāsana
24. Vibhūṣaṇāsana
25. Saptarṣiāsana
26. Kadaliāsana
40. Ghorāsana
41. Jāmāsana
42. Sarasāsana
43. Dhātāsana
44. Pṛṣṭhabandhāsana
45. Viṣṇuāsana
46. Gopyāsana
47. Vaitālāsana
48. Gaṇeśāsana
49. Yogapadayogāsana
50. .Prabhākarāsana
64. Kilkilāsana
65. Daṁsāsana
66. Siddhamuktāvaliāsana
*67. Kukkuṭāsana
*68. Mayūrāsana
69. Maśakāsana
70. Ātmārāmāsana
71. Mṛttikābhañjakāsana
72. Phodyāsana
73. Maṅgalabandhāsana
74. Nidrānāśāsana
87. Balijasyāsana
88. Vikaṭāsana
89. Karmāsana
90. Nāgabodhāsana
91. Haṁsāsana
92. Sarpāsana
93. Madhupāsana
*94–95, Siddhāsana (Vajra, Gupta, Mukta)
*96–97 Padmāsana
*98 Siṁhāsana
*99 Bhadrāsana
*100 Śavāsana

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* Āsanas found in printed edition of Haṭhapradīpikā.

Among the description of Prāṇāyāma a mention is made of Candrabheda Kumbhaka and Bhujaṅgama Kumbhaka, the latter being a synomym for Sītkāra Kumbhaka. (Kecidvadati sītkāraḥ kecidanyāhurbhujaṅgamaḥ). The Sītkara Kumbhaka is advocated to be practised any time (gacchatā tiṣṭhatā kāryam). This kind of advice is given for the practice of Ujjāyī in the printed edition.

The text is full of useful quotations and advice like "yaḥ karoti ghanābhyāsaṁ tasya siddhi na dūrataḥ/". It emphasises on the fact that practice of āsanas is only a step on the forward march of Yogic practices. It says :-

आसनेन गतो जन्मं प्राणायामं न कारयेत् ।
योगधर्मं परिभ्रष्टा गतो जन्म निरर्थकम् ॥

(Āsanena gato janmaṁ prāṇāyāmaṁ na kārayet /
yogadharma paribhraṣṭā gato janma nirarthakam //)
H. P. III-83.

This indicates the purpose of āsanas. Varied description of the seat for the practice of āsanas is also found.

An interesting problem that is created by the Jodhpur manuscript is the mention, of 'Siddhānta Mukāvali' along with 'Haṭhapradīpikā' in the colophon. What is the relation of Siddhānta Muktāvali with Haṭhapradīpikā? Has Hāṭhapradīpikā something to do with Siddhānta ?

According to Brihadyogi Yājñavalkya Smriti, Siddhānta means 'an orthodox system of philosophy' and the number of these systems is seven which are enumerated as : Hiraṇyagarbha, Kapila, Apāntaratama, Sanatkumāra, Brahmiṣtha, Pāśupata and Pāñcarātra. However, the word 'Siddhānta' * refers to a work to be studied by those who seek self-realisation (Ātmajñāna nimittam tu siddhāntāni vicintayet // Br. Yāj. Sm., XII–35). From this point of view Swatmarama considers Haṭhapradīpikā as a Siddhānta grantha of Haṭhayoga. He mentions in the end of the text as follows :

> "Haṭhapradīpikāṁ śrutvā siddhānta granthamuttamam /
> tyaktvābhrāntimaśāstrāṇi satāṁ sadya parāṁ gatiḥ //"

In order to emphasize that his treatise on Hathayoga is a Siddhānta grantha, he seems to mention this fact in the colophon of each chapter when he says :

"Iti Śri Sahajanātha śiṣyena śri Svātmārāma yogīndreṇa viracitāyām haṭhapradīpikāyām siddhānta muktāvalyām — — — upadeśaḥ//"

We do not find copies containing in the colophon the mention of "Siddhānta muktāvali" except one which we could locate in the Bhandarkar Oriental Research Institute, Poona vide No. 222/1884-86. But the contents of this copy do not tally with that of Jodhpur manuscript; they mostly tally with the printed edition. However, in this copy we find some topics and verses not available in the printed edition but are contained in the Jodhpur manuscript.

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*We get similar meaning from the famous standard texts like siddhasiddhānta-paddhati and siddhasiddhānta-saṁgraha. Also cf. सिध्दान्तो नाम स यः परीक्षकै बहुविधं परीक्ष्य । हेतुभिश्च साधयित्वा स्थाप्यते निर्णयः ।। च. वि. 8-37.

In kalākramagadyam (Adyar Ms. No. TR–1185) Siddhānta is differentiated from Vedānta, thus :

शिवो ऽ हमस्मि सिध्दान्ते वेदान्ते सोऽहमस्मीति ।"

The fourth chapter in this B. O. R. I. manuscript is incomplete. Therefore we do not know the number of verses contained in this chapter. Similarly we do not know whether this manuscript contained Vth and VIth chapters. Two pages containing verses from 12 to 33 are found in this manuscript which belong to next chapter. Ten and half verses of the beginning of the chapter which describe Kālajñāna are missing. Even out of 45 verses devoted to Kālajñāna in the Jodhpur manuscript, only 17 verses in verbatim are available in this B. O. R. I. manuscript. Further portion is missing. Therefore, it is not known how many verses were devoted to this fragmentary chapter.

As compared to the printed edition the end in the Jodhpur manuscript seems to be more appropriate than abrupt.

Conclusion :

In the light of the above discussion it may be suggested that the Jodhpur manuscript represents original text of Haṭhapradīpikā. It was also called Siddhāntamuktāvali. In the later recensions much of the contents of the text was left out and the text was abridged. We have no means to ascertain whether Svātmārāma himself was responsible for this abridgement or some one else. The mention of Siddhāntamuktāvali continued for some time and later as we find in the printed editions, the name Siddhāntamuktāvali was dropped out. The text of Haṭhapradīpikā seems to have passed through these three stages at least. But for the study of elaborate description and contents we have to turn our attention to Jodhpur Manuscript only.

Yoga Mimamsa Vol. XXVIII, No. 2, pp. 29 to 43. July 1989

ASANA : A Historical and Definitional Analysis*

*Dr. M. L. Gharote***

Introduction :

Asana is one of the characteristic techniques of Indian spiritual discipline. It is distinctly a sign of transcending the human consciousness. The motionless position of the body imitates some other condition than human. Man by definition is mobile, agitated, unrhythmic. Asana is an 'ekāgratā' on physical plane. (शरीराचलताभावे न हि चित्तं स्थिरं भवेत् ।) Just as an 'ekagrata' puts an end to the fluctuations of mind so also asana puts an end to the mobility of the body by reducing the infinitely possible positions to a single posture. Refusal to move in the asana leads to series of refusals of every kind on the path of Yoga. Patanjali has also linked the practice of Asana with 'anantasamāpatti' which is beyond mere physical performance.

To-day the practice of Asanas has become almost synonymous with yoga. What is the place of Asana in the whole discipline of yoga, however, will not be clear unless we deal with the historical development and critical analysis of the concept of Asana along with the various approaches to it. The purpose of this presentation is to consider the theme of Asana squarely.

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* Paper read in the Seminar on Asanas on 20-4-1989 at Kaivalyadhama. Lonavla.

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We must distinguish between Asana as a concept and Asana as a technique. The conceptual understanding would lead us to gain proper insight into the technique of Asana as well.

The meaning and scope of Asana

The word 'Asana' has been derived from the Sanskrit root 'ās' meaning 'to sit' (āsyate anena). This derivative meaning has been used to explain the term physically as well as metaphysically. Physically, it denotes posture - a sitting posture or a seat. Metaphysically it has been interpreted by several texts as 'establishment in the original state' (Svasvarūpe samāsannatā).

This metaphysical aspect of Asana is found expressed in the texts of Nāthayogins like 'Siddhasiddhāntapaddhati', Jñānadīpabodha, Sabadī of yogi Vicāranātha. In Jainyoga Asana is considered as withdrawing from Parabhāva (extraversion) to Svahnāva (introversion). Acharya Haribhadra calls it Sukhāsana. It is interesting to note that despite the fact that Jainayoga is full of rigorous ascetic practices, there are very few Asanas involving difficult bodily postures as we find in Hathayoga. The suggested meaning of the word Udāsīna indicates similar approach which is confirmed by Rājayogā-rahasyam when it states :

'सर्ववस्तुन्युदासीनभावमासनमुच्यते ।'

This is a typical Vedantic approach to explain Yogic terminology.

The following Hindi song brings out the mataphysical meaning by the use of the pun on the word Asana.

भैया जो तुम आस न मारो तो क्या खाली आसन मारो ।। ध्रु ।।

Oh dear, if you do not control the desire what is the use of performing Asana !

आस रही आसन साधन पर, तौ व्यर्थ प्रयत्न विचारो–भैया०

After the practice of Asana if the desires linger on, then all efforts are in vain.

आस मारि आसन जब मारो, तब सुधरहि जनमारो–भैया०

If you control the desire and when you practise Asana the life is successful.

विविध वासना त्याग न करिके, क्यों तन तोरिहि डारो–भैया०

Without controlling the various desires and instincts why do you torture your body.

आस न तजि आसन करने से, काज न होई तिहारो–भैया०

With the practice of Asana if you do not leave the desires, no useful purpose will be served.

दृढ विराग विषयों पैं करिके, मन मकान यहि झारो–भैया०

With firm detachment from the object of enjoyment clean the house of your mind.

आसन आधि उपाधि मिटावत, तनसुख पथ कर न्यारो–भैया०

Asana removes miseries by contributing to the feeling of well-being.

नहि नट खेल समान कला यहि, समुझ समुझ चित्त धारो–भैया०

It is not like a play of an actor, which should be impressed on the mind.

नाथ कृपा नरसिंह बनावे जो करि आस न, आसन मारो–भैया०

With the grace of the Lord and Guru man becomes super-man if he is not affected by desires and instincts.

In the light of the above discussion the metaphysical characteristics of Āsana may be stated as below :

आसन लक्षण

आशापाशविनिर्मुक्त आदिमध्यान्तनिर्मलः ।
वासना वर्जितं येन आकारस्तस्य लक्षणम् ।।
वर्तमानो निवर्तन्ते गतचिन्ता निरामयम् ।

ध्यानधारण निर्मुक्तो सकारस्तस्य लक्षणम् ।।
तत्त्ववेत्ता विचिन्तानि चित्तचेष्टाविवर्जित: ।
तमोऽहंकारनिर्मुक्त: नकारस्तस्य लक्षणम् ।।
।। इति आसन लक्षणम् ।।

Physically speaking Asana has two distinct meanings. Firstly, it denotes the seat on which the Sādhaka sits for his sādhanā. Secondly, it implies different postures of the body used during Yoga sādhanā.

Asana as a Seat :

Asana is an architectural expression implying a seat, a mouldiug, a type of structure. In Mānasāra (XXX-12, 13) a three storeyed building is called Āsana. Rigveda uses different terms like 'garta', 'Vandhura' for the seat in chariot (cf. स्तुहि श्रुतं गर्तसदं युवानम् । ऋ. 2–33–11 or त्रिवन्धुर ऋ. 1–118–1–2). The word Āsan (आसन् with न् हलन्त) means 'mouth'. (Rig. 1.116.14, 5.76.6, 9.69.2). Other terms used by Jain writers for asana are Paṭṭa, Sthala, Sthāna. The term 'barhi' is used in Rigveda 10. 15, 3–4, 3.42.2 for the seat prepared with kuśa grass. (बर्हिषद्, ऋ. 10-15-3-4; बर्हिष्ठ, ऋ. 3.42.2).

Kinds of Seat :

Bhagawadgītā (VI–11) refers to asana as a seat which is covered with kuśa grass, deer skin and a cotton garment in that order.

The seat is made of wood, rock, ground or sand which is suitably covered with deer skin, tiger skin, elephant skin, buffallow skin, woolen cloth, kuśa grass and/or clean cotton cloth. Significance of using different kinds of seat and their effects have also been mentioned in the yogic literature. For Example, the kriyā–kāṇḍa of Gautamadharmasūtra states as follows :

"Poverty on the bamboo-seat. Emergence of disease on rock. Abundance of sorrow on the floor. Loss of fame on the grass-seat. Mental disturbance on the leaf. Accomplishment of knowledge on black skin. Emancipation on the tiger's skin. Wealth on the cloth-seat. Removal of disease on the cane-seat. Silken garment giving health. The woolen blanket releasing from sorrow."

However, in Jainyoga the seat on the ground, on sand or one made of wood or stone is recommended (cf. Jñānārṇava, 28 : 9–11).

In Tantric sādhanā some notable seats on which an advanced sādhaka may sit for meditation are Shavāsana (corpse), Muṇḍāsana (5 skulls of different animals including that of man), and Citāsana (funeral pyre).

Asana as a posture :

The antiquity of asana as a posture is very great. The excavations of the seals at Mohenjodaro and Harappa bear the testimony of the practice of asana.

In Vedas we do not get direct reference to the word āsana or names of asanas; yet we do get indications of some modes of sitting. The word 'Mitajñu' in Rigveda (Rg. 7.95.4, 3.59.3) means assuming a squatting position. Another word 'Abhijñu' (Rg. 1.37.10, 3.39.5, 7.2.4) means sitting on toes with knees raised as in utkāṭasana. Similar posture is practised by Jains during meditation. The expression 'Jānu ā acya' (Rg. 10.15.7) in Rigveda and 'savyaṁ jānu acya' in Śatapathabrāhmaṇa (Śat. Br. 2.4.2.2) mean 'with leg folded'. In the prescribed ritual for manes it is customary to fold left leg while for divine beings right leg is folded, the other knee being raised during sitting. These prescriptions are obligatory. Sāyaṇabhāṣya on the

Taittirīya āraṇyaka has a reference to a pose similar to the Gomukhāsana, although no specific name is given in the text.

There is no mention of asana in the earliest Upanishads. The first mention is found in śvetāśvatara upanishad.

The epics like Rāmāyana, Mahābhārata S̀āntiparva (Adhy. 237, 241. 317) and Yoga Vāsisṭha have direct reference to Asana as sitting postures. Mahābhārata mentions 12 types of yoga out of which Deśayoga and upāyayoga relate to the practice of Asana as a posture. When it is done in a suitable place like in the forest, cave, lonely place it is termed as Deśayoga. When one sits in a posture for Dhyāna or meditation it is called Upāyayoga.

From the available sources regarding sādhanā of Bhagawan Mahavira we find the mention of number of Asanas in which he was practising Dhyāna.

In Aupapātika Sūtra we get a reference to a typical Asana in which the S̀ramanas were found to meditate. In this Asana the two knees were raised and head lowered.

In this very text there is a discussion about Asanas under the analysis of Kayaklesha.

Daśāśrutaskandhasutra (दशाश्रुतस्कन्धसूत्र) mentions about practising Dhyāna in different Ásanas.

Acharya Haribhadra, the great writer on Jain Yoga uses the word 'Sthāna' for āsana in his Yogaviṁśikā. The use of the word 'Sthāna' for āsana seems most appropriate because the term 'āsana' is used for sitting posture while 'Sthāna' refers to any condition of the body assumed for meditation.

In Oghaniryuktibhāṣya (ओघनिर्युक्तिभाष्य) three types of Āsana or Sthāna have been described as :

1. Ūrdhvasthāna
2. Niṣidana sthāna
3. Śayana sthāna

Asanas in the standing position are called Ūrdhvasthāna. They have been divided into seven categories as follows :

1. Sādhāraṇa
2. Savicāra
3. Sanniruddha
4. Vyutsarga
5. Samapāda
6. Ekapāda
7. Gṛdhroḍḍina

This shows that this practice of Asanas was systematised and was in vogue at one time. However, later on it was relegated to background and to-day we are at loss to establish it again in practice.

Although the tradition of Jainyoga does not coincide with the Hathayogic practices we do find the influence of Hathayogic practices from 8th century to 12 century. Due cognisance seems to have been taken by later Jain Acharyas like Somadeva, Hemachandra, Shubhacandra etc.

Hemachandra in his Yogaśāstra mentions the following āsanas suitable for dhyāna :

Paryaṅka, Vīra, Vajra, Abja, Bhadra, Daṇḍa, Utkaṭika, Godohika, Kāyotsarga, Uttānaka, Pārśvaśāyi, Naiṣadhika, Lagaḍaśāyi, Daṇḍāyatika, Āmrakubja.

Among Jains five types of asanas called Mokṣāsanas, were specified which are Paryaṅkāsana, Ardha-paryaṅkāsana, Vaira, Khaḍga and Vīra. These were the postures assumed by a Jain when he had attained or was on the way of attaining salvation (Mokṣa). Paryaṅkāsana is also known as Padmāsana or Saṁparyaṅkāsana.

Buddha himself had practised Yoga under the guidance of Arada Kalam and Uddaka Rāmaputta and he is shown traditionally sitting in Padmāsana in every sculpture. In Buddhist Yoga various modes of sitting were assigned spiritual significance. Thus, we find Paryaṅka, Vajraparyaṅka, Lalita, Bhadra. Ālīḍha, Pratyālīḍha, Nāṭya and a variety of Ardhaparyaṅka āsanas. Vajraparyaṅka implied deep contemplation and introspection. The Ardhaparyaṅka indicated tranquillity, the Ālīḍha valour, Pratyālīḍha ruin and strong aversion and dancing in the Ardhaparyaṅka connoted anger and terror. In Buddhist tradition an earliest mention about āsana as technique occurs in the Buddhacarita of Ashvaghosha.

The period of Smriti literature is very long. Some Smrities had been composed before 500 B. C. and some were written till about 1000 A. D. In one of the oldest and important Smrities, namely, Brihadyogiyajnavalkya Smriti, we get elaborate description of Asana, both as a seat as well as a posture. The seat is described to be "cailājinakuśottara" which is neither too low nor too raised which is used for taking a posture of Padmāsana. While describing the posture the following subtle points have been mentioned :

a) Facing North-East and sitting erect.
b) Pressing the chin against chest;
c) Closing the mouth without touching the teeth

d) Tongue pressing against the palate;
e) Remaining steady like a rock.

(Br. Yāj. Sm. IX : 186-190).

Definitional Analysis :

Definitional analysis of Asana may take into consideration the following points :

a) Special feature of definition
b) Characteristics of Asana
c) Salient points during performance of Asana. For example, centre of gravity considered important for maintaining the posture for a longer duration.
d) Purpose of Asana
e) Suggested benefits of Asana
f) Asana as a Yogāṅga in an integrated scheme of Yoga.

If we analyse the various definitions of Asana, we get three levels on which Asana could be considered. These three levels from gross to subtle are :

a) Conditioning āsanas
b) Meditative āsanas
c) Svarupa āsana.

a) **Conditioning Asana :**

In this category we get āsana described as contributing to the various aspects of health and fitness. For example :

कुर्यात्तदासनं स्थैर्यमारोग्यं चांगलाघवम् । ह. प्र.
(kuryāttadāsanam sthairyaṁ ārogyaṁ cāṅgalāghavam/)

आसनं योगसिध्यर्थं कायशोधनहेतुना । रुद्रयामल
(āsanam yogasidhyarthaṁ kāyaśodhanahetunā /)
स्थिरसुखमासनम् । पा. यो. सू.
(Sthirasukhamāsanam/)
आसनेन दृढता । घे. सं.
(āsanena dṛdhatā)

b) **Meditative Asana :**

In this type of definition the emphasis is on appropriate sitting posture with particular arrangement of the upper and lower extremities. Thus we get –

शरीर विन्यास विशेषः आसनम् । स्मार्तयोग
(śarīra vinyāsa viśeṣaḥ āsanam/)
करचरण संस्थान विशेषः । योगचिंतामणि
(karacaranasaṁsthāna viśeṣaḥ/)
समग्रीवशिरःस्कन्धः समपृष्ठः समोदरः । व. सं. III-45
(samagrīvaśiraḥskandhaḥ samapṛṣṭhaḥ samodaraḥ/)
समग्रीवशिरः काय उन्नतास्यः सुनिश्चलः । व. सं. II-61
(samagrīvaśiraḥkāya unnatāsyaḥ suniścalaḥ/)
उपविश्यासने युञ्ज्याद्...((upaviśyāsane yuñjyād...)
समंकायशिरोग्रीवं धारयन्नचलं स्थिरः ।
संप्रेक्ष्य नासिकाग्रं स्वं दिशश्चानवलोकयन् ।। भ. गी. VI-12,13.
(samaṁkāyaśirogrīvaṁ dhārayannacalaṁ sthiraḥ
saṁprekṣya nāsikāgraṁ svaṁ diśaścānavalokayan /)

c) **Svarupa Asana :**

Here āsana is considered as the establishment in the highest stage of Yoga.

आसनमिति स्वस्वरूपे समासन्नता । सि. सि. प. II-34.
(āsanamiti svasvarūpe samāsannatā/)
सुखेनैव भवेद्यस्मिन् अजस्रं ब्रह्मचिन्तनम् ।
आसनं तद्विजानीयाद् अन्यत्सुखविनाशनम् । तेजो. उप. I-25.
(sukhenaiva bhavedyasmin ajasraṁ brahmacintanam
āsanaṁ tadvijanīyād anyatsukhavināśanam //)

अलेख आसन तहां विश्राम ।
(alekha āsana tahān viśrāma/
निरवलम्बो पीठम् । निर्वाण उप०
(niravalambo pīṭham/)
आसनं विजितं येन जितं तेन जगत्त्रयम् । त्रिशिखिब्राह्मणोप–52.
(āsanaṁ vijitaṁ yena jitaṁ tena jagattrayam/)
स्वरूपे यत् सदाकालमासनं तत् सुखासनम् । राजयोगरहस्यम् ।
(svarūpe yat sadākālamāsanaṁ tat sukhāsanam/)
आस न मारो तो क्या खाली आसन मारो ।
(āsa na māro to kyā khāli āsana māro/)

From the above description it wiil be found that āsana is a continuum of yogic process which starts with the physical aspect arranging upper and lower extremities and ends in the complete stability of the body and mind. In Mahābhārata we get a beautiful description of this state of steadiness. The chief principle governing the concept and technique of Āsana is stability with varying degrees. Just as the processes of Dhāraṇā, Dhyāna and Samādhi are various degrees of the absorption of mind and virtually one single process, similarly we can think of the concept of Āsana.

The importance of the principle of stability in Āsana has been greatly eulogised and beautifully described by yoga rasāyana. It says as follows :

स्थिरं स्यादासनं यस्य स योगं कर्तुमर्हति ।
शरीराचलताभावे न हि चित्तं स्थिरं भवेत् ॥
आसने स्थिरतां याते मनःस्थैर्यं भवेत् ध्रुवम् ।
प्राणस्यापि गतिर्नूनं शिथिला संप्रजायते ॥
इंद्रियाणां च चापल्यं शान्तिमायाति निश्चितम् ।
ततो योगस्य सिद्धिः स्यात् तस्मादासनमभ्यसेत् ॥

"One who can be stable in the āsana, is fit for undergoing Yogic practices; with unstable body one cannot have a stable mind. When āsana becomes stable, surely the mind too gains stability. The movement of Prāna indeed slows down. The fickleness of the senses too is surely set at rest. Then one gets established in Yoga and therefore one should practise āsana''.

Thus in nutshell we may express Asana→stability of body and mind→Yoga.

Multiplication of Asanas

The process of multiplication of Asanas may be attributed to the following factors :

1) Change in the body position

The same asana done in different positions of the body is named differently. Examp. Paścimatāna (in sitting), Pādahastāsana (in standing).

2) Left and Right side consideration

The number of Asanas is doubled when the same asana is performed on left as well as on right side.

3) Addition of prefixes to the original asana

Rudrayāmala names nine asanas like Padmāsana, Swastikāsana, Bhadrāsana, Kārmuka, Chakra, Yogeśvara, Vīra, Kukkuṭa and Mayūra and they are further multiplied as Baddha and Mahā resulting in 27 varieties (three each of the nine asanas). The prefixes like utthita, Supta give different varieties of asana.

4) Differences in Tradition

Traditional differences cause addition in the number of asanas by describing the similar technique with different name or the same asana following different technique.

5) Modification in the original technique

When the original asana is simplified we get a different asana. Many-a-time, it is prefixed by the word 'Ardha' like Ardha-Padmāsana, Ardha-Matsyendrāsana.

By permutation and combination different varieties of asana could be formed and have been formed.

So far as multiplication of Asanas is concerned it has been aptly said and oft quoted that " आसनानि च तावन्ति यावन्तो जीवजन्तव: ।" (āsanāni ca tāvanti yāvanto Jīvajantavaḥ/) meaning that there could be endless multiplication of the asanas. This provides enough choice to the person for selection of suitable asanas for his own practice. Multiplication of Asanas leave greater room for the individual to choose the variety of asanas suited to one's purpose.

Comparison of No. of Asanas
(from selected texts)

1.	Haṭhapradīpikā (Jodhpur Ms.)	108 Asanas
2.	Yogāsanamālā	102 Asanas
3.	Rudrayāmala	100 Asanas
4.	Haṭharatnāvali	78 Asanas
5.	Kapālakurantaka | Haṭhābhyāsapaddhati |	56 Asanas.
6.	Haṭhasaṅketacandrikā	48 Asanas
7.	Yogasiddhāntacandrikā by Nārāyaṇatīrtha— A commentary on PYS	38 Asanas
8.	Gheraṇḍa Saṁhitā	34 Asanas
9.	Haṭhayoga-Āsana Lakṣaṇam	32 Asanas
10.	Nārada Purāṇa	30 Asanas
11.	Jogapradīpyakā	21 Asanas.

Asanas as Physical Exercise :

Once the trend of multiplication of Asanas started, there have been the growth in the number of Asanas in different directions. Asanas were not only practised for spiritual gains but they were also used as physical exercises involving great deal of skill, flexibility and neuro-muscular cordination. One of the less known group of Asanas which has been described in the Kapāla Kuraṇṭaka Haṭhābhyāsa Paddhati as Rajvāsanāni meaning Asanas on rope. This trend further developed using asanas on the Mallakhamb (Wrestler's post) and today we find several asanas being performed on the Mallakhamb.

Inclusion of Asanas in the Physical Education Curriculum :

It is our common observation that Asanas have become a part of physical education programme in schools. However, Asanas were included in the curriculum of physical education for the first time in 1927 by the Shri K. M. Munshi Committee, appointed by the then Bombay Government. Later in 1937 when Kuvalayananda Committee was appointed by the Bombay Government to prepare the plan for physical education in the Bombay state, the committee emphasized on the indigenous physical activities and included some Yogasanas in the curriculum. In the Training Institute for Physical Education established at Kandivli (Bombay) by the Govt. of Bombay Yogasanas formed a part of training programme for the teachers. In 1956 when the National Plan for Physical Education was prepared, a curriculum of Yogic exercises (mostly asanas) was accepted along with other activities. Thus Yogasanas became integral part of physical education programme. In order to systematise Yogic training Govt. of India, Ministry of Education, for the first time in 1959 introduced a scheme of Yogic training for the in-service physical education teachers. Accordingly, the first Yogic training course was organised under the direction of Swami Kuvalayanandaji at Lonavla in 1959. Swami Kuvalayanandaji had also earlier in 1932 organised training of Asanas to the secondary school teachers at the request of the Govt. of Uttar Pradesh.

Principal points to be derived from the study of Asanas :

1. Asana as a technique is of great antiquity. Asana has some purpose to serve which can be varied according to individual considerations right from feeling of well-being to help in meditation.
2. Asanas cater to the need of individual variations. As many individuals as many asanas.
3. Asanas have complementary relationship. All asanas contribute to stability and comfort necessary for meditative mood.
4. Asanas derive psycho-physiological benefits.
5. Stability and comfort are the main characteristics of Asana.
6. Asana is an end as well as means. Asana as a means indicate different techniques. As an end it represents stable and comfortable meditative pose forming essential background for the attainment of highest state of consciousness called Samadhi.
7. One needs to select a single asana of choice suitable for oneself.
8. All kinds of variations and modifications are possible and allowed to serve the basic purpose of Asana.

● ●

Yoga Mimamsa Vol. XXVIII, No. 2. pp. 44 to 53, July 1989.

'Sandhi', 'Samadhi', and 'Vyadhi' - Some Considerations

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1.0 **Introduction :**

1.1 Patanjala Yoga Sutras I : 23 to I 39 were studied in more details while considering the possibility of re-interpreting P. Y. S. I : 29 (Dave and Bhole, 1989). Twenty Eight commnetaries were referred during this study (Appendix – I). It was observed by the authors that all the 28 commentators on Yoga Sutras have translated the term 'Vyādhi' appearing in P. Y. S. I : 30, as disease or sickness in the sense in which it is described and understood in Ayuryeda and modern medicine (Prasad, B. N. 1967). However, in the sutra I : 30 ('Vyādhi-styāna-saṁsaya – pramādālasyāvirati – bhrāntidarshanālabdha-bhūmikatvanavasthitatvāni cittaviksepāste'ntarāyāḥ') itself, this term has been used as 'Cittavikshepa' (disturbance of chitta) and as an 'Antaraya' (obstacle or hindrance).

1.2 It was observed that P. Y. Ss. are more concerned with the behaviour and states of chitta (chitta-vrittis and chittabhumis) rather than the body and the mind. On the other hand Ayurveda and modern medicine have given more importance of the body and the mind for the purpose of treatment. Consideration of chita, if at all it is there, remains in the background. Therefore. interpretation of the term

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'Vyādhi' as physical and mental illness, disease or sickness only appears to be 'out of tune' with the overall approach in P. Y. S. It was, therefore, realised that one should find out an all-embracing understanding of the term 'Vyādhi' which will be in line with the spirit of P. Y. Ss.

1.3 While searching for a suitable understanding of the term 'Vyādhi', it was realised that Yoga is one of the six 'Astika-Darshanas' accepting Vedas as as the final authority. Naturally one should expect to find some connections between P. Y. Ss. & Vedic thought and terminology. The terms 'Yoga' and 'Samādhi' were selected to find out these connections for the present study. After some scrutinisation of the literature and discussions with the scholars it was noticed that these terms are not found in Vedic terminology as they are. Therefore a need to find out direct or indirect relationship was felt by the authors.

1.4 In this connection, attempts were made in the following directions :

a) to find out the connecting links in Vedic terminology with reference to the terms 'Yoga' and 'Samādhi' of P. Y. Ss.

b) to understand the term 'Vyādhi' in relation to Chitta, and;

c) to understand the relationship between Samādhi and Vyādhi, if at all it exists.

The work was carried out under the overall guidance and supervision of Swami Digambarji, a renowned personality in the field of Yoga, Spiritual head and Director of Research in Kaivalyadhama.

2.0 Discussions :

2.1.1 In Vedic language we find the word 'Sandhi' with the root 'dhi' (i. e. sam+dhi) which invariably indicates union e. g. to hold, to contact or to possess (Apte, 1963). Two examples are given below to support this statement.

a)

.....santatyai sandhīyate prajayā pashubhirya evaṁ veda. (Devayajana)

(i. e. to possess offsprings and cattle etc.)

b)

.....Vākpatangāy dhīyate. (Rigveda, 10.189.3)

(i. e. our speech should remain in contact with the (Savitru) principle).

2.1.2 The term Samādhi could be broken up as Sam + ā + dhi. In this way the root 'dhi' is common in both the terms, Sandhi and Samādhi.

2.1.3 However, the term Samādhi is usually analysed as Sam + ā + dhā (सम + आ + धा) (Shabdakalpadrum, 1961). Even the term Sandhi could also be analysed as Sam + ā + dha and thus relationship between these two terms becomes evident even after analying Samādhi as Sam + ā + dhā.

2.1.4 Therefore, the word Sandhi could be treated as a synonym of the word Yoga as both mean Union, joining or combining (Apte, 1963, p. 459 & 583).

2.2.1 We find that the root 'Dhā' is indicative of 'doing' i. e. action or 'Kriyā' e. g. to put, to place, to lay, to perform etc. while the root 'Dhi' is indicative of a 'state' or 'happening' e. g. to possess, to hold etc. (Apte, 1963)

(For example : 1. 'to do an asana' and 'to be in a asana;

2. 'to perform japa or puja' and 'to be in meditation or Samadhi'

2.2.2 Thus, the term Samādhi, appearing in P. Y. S. gives us the overall understanding of an integrated and balanced state of the citta and it could be understood as a process as well as the final state.

2.2.3 It is seriously felt that in Yogic language, the root 'dhā' seems to resemble 'Prayoga' i. e. 'doing' aspect and the root 'dhi' seems to represent 'Saṁprayoga' i. e. 'happening' aspect. In this way both the interpretations could be accepted for the purpose of analysing and understanding the term 'Samadhi'. However, the authors feel that understanding this term with the root 'dhā' is preferable during sadhana and the root 'dhi' should be preferred to indicate the final out come of Sadhanā.

2.3.0 The term Vyādhi can be analysed as Vi + ā + dhi and as Vi + ā + dhā in the same way as Samadhi and it indicates the chitta in contact with various imbalances leading to disequilibrium which is exactly opposit of Samādhi.

2.3.1 All the twenty eight commentaries referred by the present authors described the term 'Vyādhi' as disease or sickness (i. e. Roga) in the frame work of Ayurveda or modern medicine. Ayurveda considers Vyādhi to be related with the physical body and not with the citta as mentioned above.

If a limited view of Vyādhi as physical illness or disease is accepted then the line of thinking starts from the body and ultimately it may reach the level of the citta. If Vyādhi is looked upon as a disturbed condition of the chitta, then the journey will start from the citta either towards the body or towards the Purusha vishesha. Eventhough the actual journey will be mutual and bi-lateral; to understand P. Y. S., it is better to think in terms of Purusha vishesha i. e. 'Īshwara'.

2.4 Thus we can propose and presume that the terms Samādhi and Vyādhi appearing in P. Y. Ss, are directly linked with the Vedic term 'Sandhi' having the root 'dhi' and they are indicating two different states or conditions of chitta, which are opposite in nature.

3.0 **Conclusion :**

3.1 In conclusion, it could be said that :

a) The Vedic term 'Sandhi' can convey the overall meaning of the term 'Yoga' in the sense of union or joining.

b) The term 'Samādhi' and 'Vyādhi' appearing in P. Y. Ss. could be linked with the Vedic term 'Sandhi' as all the three terms have the common roots 'dhi' or 'dhā' meaning union or contact.

c) The use of the root 'dhā' indicates the doing aspect (i. e. Prayoga) while the use of the root 'dhi' indicates the final out come of the doing aspect (i. e. Samprayoga). Thus both the roots could be used to translate, interpret and understand these terms.

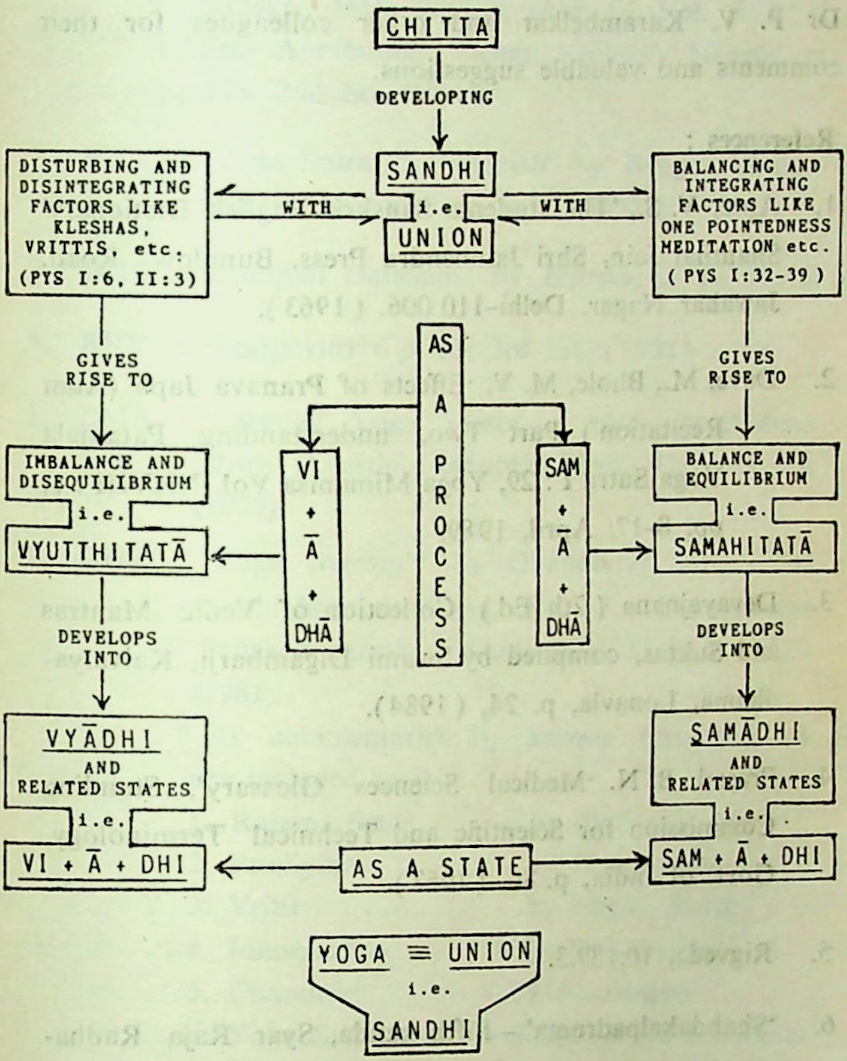
d) The terms 'Samādhi' and 'Vyādhi' appearing in P. Y. S. are indicating two opposite conditions of the chitta.

Chitta in contact with the balancing and integrating factors as mentioned in P, Y. S. I : 32 to 39, and II : 1 will give rise to 'Samadhi' and when in contact with disturbing factors like Klesha and vrittis will give rise to 'Vyādhi'.

3.2 The above conclusions have been structuralized in the text figure.

FIGURE

STRUCTURALISATION OF THE CONCEPT OF, 'SANDHI', 'SAMĀDHI' AND 'VYĀDHI'



TAM VIDYAD DUKHASAMYOGAVIYOGAM YOGASANJNITAM.

THE KNOWLEDGE OF THE UNION WITH PAIN (DUKHA SAMYOGA) AND THEIR SEPERATION (DUKHASAMYOGA VIYOGA) IS CALLED YOGA.

(Bh.Gita VI:23)

Acknowledgements :

The authors are grateful to Dr. M. V. Rajapurkar; Dr P. V. Karambelkar and other colleagues for their comments and valuable suggestions.

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5. Rigveda, 10.189.3.

6. 'Shabdakalpadruma' – Fifth kanda, Syar Raja Radhakantdeva – Bahadurena, Motilal Banarasidas, p. 271 (1961).

7. Reference of the Commentaries on P. Y. S. given in the Appendix.

APPENDIX-1.

1. APR : 'The Science of Yoga' by Aprabuddha,–Vaidik Sanskrit Mala Pushpa, 14 & 15, Vol. I & II Shri Aprabuddh Vichar Sadhana Nagpur – p. 123, 2nd Ed. (1988).

2. BB : 'Yoga Sutra of Patanjali' by Bangali Baba – Motilal Banarasidas – p. 15, (1976).

3. BHD : 'Patanjal Darsanm' by Bhojadeva – p. 14–15.

4. BHV : 'Bhojarritti' 6 p. 33, 3rd Ed. (1932).

5, BMA : 'Patanjal Yoga Sastra – a study' by Brahma Mitra Avasthi – Induprakashan, Delhi, p. 17, (1978).

6. DHS : 'Yoga Sutram'* by Dhundhiraj Sastri – The Kashi Sanskrit Series, No. 83, – Chaukhamba Sanskrit Sansthan, Varanasi, p. 35–36, 2nd Ed. (1982).

* Six commentaries by known commentators are included in it :

1. Rajamartands – by Bhojaraj.
2. Pradipika – by Bhavaganesa
3. Vritti – by Nagoji Bhatta
4. Maniprabha – by Ramananda Yati
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Yoga Mimamsa Vol. XXVIII, No. 2, pp. 54 to 60. July 1989

Role and Place of Primary Mass Pysioprophylaxis in improving the effectiveness of Rest and Hiking*

*Lyubomir Lakhchev***

Now-a-days we live in the era of scientific and technical revolution. The sequelae of that revolution, positive and negative, are already known. They have brought serious problems before the humanity. Hypodynamia and high psycho-physical strain have given rise to grave deviations from the basic factors of the norms of health and moral stability of the individuals that had been adopted so far. They raised an alarm about the potentialities of man, about the adaptation and reproduction of life, about its protection against all deleterious effects of external and internal environment.

Only man, out of all the animal world, have the greatest adaptation potentialities, probably – infinite (for the healthy individual).

Nature, in the process of evolution, has stored immense reserves of psycho-physical energy in human organism that would be sufficient for another million of years of evolution but only under certain conditions. Those conditions are also known – the fundamental one being life in harmony with nature and constant aspiration for an inner harmony and refinement.

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Since the time of the great discoveries of cosmic rays (Robert Milcon, 1921) heavy water (deuteria) (Uray, 1934) till today, science and human thoughts penetrate even further in the secrets of space and cells; but as regards human being – they remain debtors.

Man, alone, should turn his eyes to the most inner layer of his brain, to look for the good health and inner harmony within himself, guaranting him a happy life so that he, himself, becomes aware of his internal being, the so called POSITIONAL PHYSIOLOGICAL SUBSTRATE* modelling the structural pattern of personality in a new man, with realized creative flight to new worlds and discoveries, until reaching the complete inner harmony and psycho-physiological development.

So far there is no integral and sure prescription for attaining that state. However, numerous are the individuals, teams, institutes searching for scientific means for preserving health, capacity for work and vital tone of man. That search is facilitated by the communications and contact possibilities among the peoples.

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*Positional physiological substrate – it is with a functional base of reflexes and behaviour, including subcortex with its responding systems, guaranting normal muscular tone and harmonious work of brain and body of all organs and systems as one integral ensemble in human organism, bound in one complete representation of their initial community. See Kuvalyananda Swami and Dr. Vinekar, Joga therapy, Warsaw, 1971.

Doctrines and methods for a healthy life of some eastern peoples have been disseminated throughout Europe during the last several decades. Acupuncture and acu-pressure, judo-massage, aerobic, etc. penetrated into everyday life and medical practice of Europeans. However, all those methods are not in conformity with the European climate, way of life and psycho-physical structure of the individual. That is why every contemporary of ours should do all possible to solve the problems of the healthy way of life both for himself, his family and the staff.

A prophylactic complex of tonic exercises (T. E.) is proposed in this paper that are combined with effects upon the whole personality, allowing the participants to acquire personal experience in maintaining the tone of the deep back muscles, where the influence of brain is less felt and their activity is almost automatic, performed with the slightest muscular effort. The complex is completed by suggestion in the state of relaxation.

As a whole this is a prophylactic complex for harmonization and setting the body in motion with general tranquillization and relaxation. It consists of flowing rhythmical movements and dynamic exercises, different for each day of the week so as to attain a proper combination of cyclic and static exercises with rhythmical breathing.

That is attained by the specially created positional extending models (PEM) of tonic exercises. different for each day of the week, integrated into complexes. The tonic exercises are the fundament of the complex for the day, being the new that is proposed, with the attention focused upon the antigravitational muscles.* The effect is mainly on the big open joints aiming at the maintenance and recovery of their flexibility. Gradually the deep muscles of the vertebral column are involved to enhance their endurance and correct the existing deformities.

In order to integrate the tonic exercises with breathing and physioprophylaxis out-of-doors, we formulated a method for tonic and respiration control with general relaxation[1]. It includes (enduring) measures with cold stimulant for the upper respiratory pathways, after barefoot-walks along various slopes of the "path of health" in the town of Bankja. The rinsing of both nostriles with hyper- and hypotonic solutions, prepared in advance, of sea-salt and water, is the first hygienic procedure of the day, followed by breathing drills for the nasal musculature and neck.

Later on, in order to intensify the volume and strength of the lungs, alternative breathing is included with successive control of one nostril by various kinds of techniques of nostril breathing, as the begining of respiratory control.

The following step in the prophylactic complex are the special breathing exercises (SBE) with conscious control of breathing process (Pranayama).

According to Indra Devy, well known in Europe : "Anxiety, shyness, hot temper and lack of self--confidence could be overcome by controlled breathing."[1]

That is why the attention is focused on breathing through one nostril in particular – thus better control is achieved, separate consecutive breathing is attained. The mastering of breathing through both nostrils and alveolar surface of lungs depends, to a great extent, to that. It represents a large interoceptive area,[2] covering the bronchi, bronchioles, trachea, throat and nose and its extending is the particular goal in the positional-extending models (PEM) of the tonic exercises. They are different for each day of the week to form the necessary habits for controlled enregized breathing. With the cyclic breathing we are provided with what the yogis call "Prana" or energy, penetrating in all cells, where everything is in full conformity and coordination with the following state of inner harmony and psycho-physical equilibrium.

Our experience confirms that via the breathing through one nostril, the effectiveness of exhaling is enhanced by the participation of the pelvic diaphragm, when adhering to the necessary condition – the right angle between thigh and trunk. That initial body position, per se, is of importance for many people – it contributes not only to breathing but also to the harmonious shape of their figure. That is covered with the complexes for Monday and Tuesday[2] as well as the rest days of the week.

Last but not least, in parallel with the care of breathing mechanism, comes the motor acupressure as daily prophylaxis, included in the tonic exercises. The prophylactic complex terminates with the general relaxation of body and brain via hypnotherapy. Here, more attention is paid to reflectory behaviour.[3] It is associated with the emotional memory, where the respective experiences* are induced, via the following influences : elimination of the tendency to unreceptiveness and anger to oneself, autoaggression and aggression towards other people with the reverse experience of sympathy and friendliness towards all people and oneself ('Maitryadibhavana'),* in consolidation of confidence, so necessary for everyday life. The good relation among the participants is stressed upon as well as on the calm performance of the tonic exercises, flowingly and rhythmically so as to attain the desired state of joy and health.

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* Eliminate jealousy, feel sympathy toward those whom we despise, and joy and delight to those whom we detest.

Everyone participates willingly in the prophylactic group, wel-come with pleasure, to improve his health and qualities of personality with the inspiration to add life to his years and years to life.

"Less food – more movements – longer life ! " is our motto. By it, we win the recognition of the primary mass physioprophylaxis in the daily life of the holiday makers, relying primarily to self-recovery and their own efforts. The leading role of mind is always followed, the exercises are in conformity with the ambition to stability and prosperity, in order to be pleased by those first steps in improving health with further increase of strength and potentialities of "I" and capacity for work. In parallel with the stabilization of balance and movements coordination during the performananance of the tonic exercises, efforts are made to achieve an active stability of mind and body in one state and the feeling of unity between "I" and "we".

We are firmly convinced in the power of the tonic gymnastics. It is the objective of serious and comprehensive studies at big health scientific centres in India, China and Japan. It has also been applied in the training of the Indian astronaut who endured excellently the specific conditions of space.

Let us remember when we set up the landmarks of the future of the healthy man, the beginning of the primary mass physioprophylaxis – recreation has not been achieved by the individual who has grasped his own health with both hands but that individual who finds strength in himself to lend a helping hand to others to lead them to the path of health.

We hope that the tonic gymnastics and its exercises will find, in the future, their well-deserved place in the holidays of each participant in the primary mass physio prophylaxis and their active attitude will contribute to its implementation in the active rest close to nature.

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Yoga Mimamsa Vol. XXVIII, No. 2. pp. 61 to 81, July 1989.

Food and Behaviour

(A Review of Ancient & Modern Concepts)

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Abstract :

The effect of food on body and mind has been engaging our attention for sometime. A review of ancient Indian literature shows that the Indian sages have laid considerable stress to the effect of food on the mind. It is stated that subtle elements of food go to make the mind. On the basis of the effect of food on the mind, the food items are classified as Sattavic, Rajasic and Tamasik. It has also been specified as to what type of activity and behaviour is facilitated by a particular type of food intake. Thus great emphasis was put on the effect of food we take on mind and behaviour. Extensive references are found in Upanisads, B. Gita, Puranas and Yogic literature.

A review of modern literature especially in recent times, shows that amino acids in the food are converted into neuro-transmitters and consequent increase in signals leading to augumented nerve impulses in selective areas in the brain where the neuro transmitters predominates, thus modifying behaviour pattern. This has also lead to the use of food in treatment of neural disorders. That type of food intake affects memory and behaviour has also been confirmed by scientists in field experiments. These observations are in agreement with scriptural concept putforth by

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Indian sages and have given a great impetus to study the effect of food intake on brain and behaviour in Westeren laboratories.

I. Introduction :

Since times immemorial man has been concerned with food as a means of existence. The choice of food ages back must have been instinctive.

Lavoisier's work at the end of the 18th century gave nutrition a scientific base. It helped people to dispel irrational beliefs, food fadism and quackery.

The science of nutrition as understood in the west has made us aware of the energy needs of man in variaus situations. It is also known how energy in the food is converted into heat and helps maintain body temperature. The role of various food constituents as building blocks to various body components is also well known. The knowledge of deficiency of certain essential food items and vitamins in the production of 'deficiency diseases' and means to prevent them are also well documented.

In the the West, however, the emphasis in nutrition all along seems to have been on the proper maintenance of the body physique and not much attention has been paid to the effects of food we take on the mind, on the thought process and consequent human behaviour. Only recently this aspect seems to be receiving the attention of Western Scientists.

In the East, particularly in India, however, the approach to nutrition has been very different. Considerable attention has been paid to the type of food one takes and its effects on the body and on the mind.

II. Food And Ancient Indian Thought :

Ancient sages have been very conscious of the food intake. We find detailed description of quality and effects of each food item. For example, the properties and effects of meat derived from different sources like, fowl, lamb, deer etc. are described in detail. Similarly detailed descriptions of properties and effects of various food grains, vegetables, fats, milk from various sources like cow, goat, water buffalo, and other dietary items and wines are available in great detail (Charak Samhita).

"आहार संभवं वस्तु रोंगाश्चाहारसंभवः ।"

i) Concept of Triguna and Food

A more important contribution to the concept of nutrition by the Indian sages has been their philosophy of dividing all food into categories related to 'three gunas'. Food ingested nourishes different aspects of the person and has effect not only on the body, but also on the mind and person's proclivity.

To understand the ancient concept of food and its effects on the body and on the subtle element of the mind it is necessary to briefly review Samkhya concept of Prakrti. The Samkhya philosophy believes in dualistic realism. It recognizes two ultimate realities, viz., **'Purusa'** and **'Prakrti'**, Purusas are eternal and immutable principle of pure consciousness. It is intelligent but inactive and unchanging. Prakrti "primordial material" is regarded as the ultimate cause of the world objects including physical things and psychic products like the mind, intelligence and the ego. It is active and ever-changing but blind and unintelligent. (Ref. Samkhya Karika, V. 13; Bhag. Gita, 14 : 15-18).

It is in the presence of the Purusa that the Prakriti evolves the world of experience. Thus the whole course of the world evolution is an interplay of the two ultimate principles.

It is believed that prakriti evolves when there is a disturbance of the equillibrium in which the 'gunas' were held before creation. There is a gradual differentiation and integration of three gunas and as a result of their combination in different proportions the various objects of the world originate. The three gunas are

Sattva, **Rajas** and **Tamas.**

Prakrti is the ultimate cause of all world objects, hence of food objects also. All objects of the world from the intellect down to ordinary objects are formed by the process of the three gunas producing pleasure, pain and indifference respectively. Prakriti is very subtle and has tremendous power which evolves and dissolves the world in cyclic order.

The gunas always go together and can never be separated from one another. Nor can any one of them produce anything without the support of the other. The nature of them is determined by the predominant guna while others are there in a sub-ordinate position. Thus the gunas exist in everything living and non-living in different proportion and endow them with corresponding qualities. The Samkhya calls these 'Sattva', 'Rajas' and 'Tamas'. These constitute both 'Prakrti-mulprakrti or pradhan' and the ordinary objects of the world.

When one of the gunas dominates over other it leads to production of objects (Virupa-parinama) and is the starting point of world's evolution.

Cosmic process is two fold in character. Creation is the unofolding of the different order from the original prakrti and destruction is the dissolution of them into the original prakrti. At the close of the world period the products return by a reverse movement into the preceeding stage of development and so finally into prakrti (प्रकृति: प्रकृर्ति भुङ्क्ते). This cycle of evolution and re-absorption has never had a beginning and will never have an and.

Earth is composed of five elements and is the material cause of all these bodies. The gross human body is also composed of five elements.

Inorganic, vegetable and animal kingdoms are the three stages in the process of development marked only by changes in the qualities of the constituents (dharma parinama) and not in the constituents themselves. Samkhya recognizes **sthula sarira** and **suksmn sarira.**

Earth is the material cause of all these bodies. The gross body is composed of five elements. Elements of earth predominate in the body of the man.

Food is also product of prakrti and has its properties and is therefore, endowed with the three gunas–sattva, rajas, and tamas and produces the qualities discussed above. Since food is needed for the existence of **sthula sarira** which in turn is the basis for the other sariras (S. K. 41) it follows that food which sustains the **sthual sarira** in its finer and subtle forms is needed for the suksma and **anta sarira** (made of the mana, buddhi, ahamkara). Thus food in its finer forms has effects on the **suksma** sarira and being 'trigunatmaka' produces **Sattvic, Rajasic** and **Tamasic** effects depending on their preponderance and consequent modifications of the functioning of the mind. "Whatever affects the body affects the mind and whatever affects the mind affects the body." (यादृशं भुज्यते लोके जायते तादृशी मतिः)

ii) Types of Food

The Bhagwad Gita has given a beautiful description of the three kinds of food and their effects :

आयुःसत्त्वबलारोग्यसुखप्रीतिविवर्धनाः ।
रस्याः स्निग्धाः स्थिरा हृद्या आहाराः ।
सात्विकप्रियाः गी. १७.८

"Foods that augment life, firmness of mind, strength, health, happiness and delight, and which are succulent, oleaginous, substantial and agreeable, are dear to one endowed with sattva."
(B. G. 17.8).

कटवम्ललवणात्युष्णतीक्ष्मरूक्षयिदाहिनः
आहाराराजसस्येष्टा दुःखशोकामयप्रदाः ॥
गी. १७.९

"Food that are bitter, sour, salty, very hot, pungent, dry and burning, and which produce pain, sorrow and disease, are dear to one having rajas." (B. G. 17.9).

यातयामं गतरसं प्रनि पर्युषितं च यत् ।
उज्जियमपि चामेध्यं भोजनं तामसप्रियम् ॥
गी. १७.१०

"Food which is not properly cooked, lacking in essence, putrid and stale, and even ort and that which is unfit for sacrifice, is dear to one possessed of tamas."
(B. G. 17.10)

It is thus clear that consumption of Sattvic food will increase **Sattava guna,** eating Rajasic food will increase **Rajas guna**, and eating Tamasic food will increase **Tamasic guna.**

iii) Transformation of Food :

The question now naturally arises – how the effect is brought about ? The following quotations throw some lignt on this :

चतुर्विधस्य चान्नस्य रसस्त्रेधा विभज्यते ।
तत्र साररतमो लिंगरहेस्य परिपौषक: ।।
शि. सं. V–73.

सप्तधातुमयं पिण्डमेंति पुष्णाति मध्यग: ।। शि. सं. V–74.

"Of the four kinds of food (i. e. that which is chewed, that which is sucked, that which is licked and that which Is drunk), which a man takes, the chyle fluid is converted into three parts. The best part (or the finest extract of food) goes to nourish the linga sarira or subtle body (the seat of force). The second or the middle part goes to nourish this gross body composed of seven dhatus (humours) The third or the most inferior part goes out of body in the shape of excrement and urine" (Shiva Samhita, p. 61, 62 (V–53).

Further Chandogya Upanishad states :

अन्नप्रशितं त्रेधा विधीयते तस्य य: स्थविष्ठो धातुस्तत् ।
पुरीष भवति यो मध्यमस्तन्मासं योणिष्ठस्तन्मन: ।।
छा. उ. 6–5–1.

"Food when eaten becomes divided in three ways. Of it, that which is the grossest ingredient, that turns into faeces. That which is the medium constituent becomes flesh. That which is the subtle becomes mind" (Chandogya Up. VI, 5.1)

iv) Food and Mind :

How food affects the mind is explained in various scriptures as follows :

आहार शुद्धौ सत्वशुद्धिः सत्वशुद्धिः सत्वशुद्धौ ध्रुवा स्मृतिः
स्मृतिलाम्भे सर्वग्रन्थीनां विप्रमोक्षः ।। छा. उ. 7–26–2.

"From purity of food follows the purity of the internal organ. From the purification of the internal organ comes unfailing memory of the infinite. After achievement of memory comes falling asunder of all the knots of the heart." (Ch. Up. VII, 26.2),

Further references to the effect of food on mind are found in Bhavasantaranopanisad and Pasupatabrahmapanisada which are as follows :

अन्नशुद्धै सत्वस्य विवृद्धिः । भव. उ. 4.9.

"(It is) through pure food alone (there is) the enhancement of Sattava (i. e. intellect or subtle body)" (Bhavas. Up. 4/9; p. 38).

Bhavasantaranapanisad further states :

निष्कल्मषो भवेद् भक्तो राजन्शुद्धान्नभोजनात् ।।
प्रसीदन्तीन्द्रियाण्याशु सत्वं च परिवर्धंते ।। भव. उ 4.15.

"The devotee, O King becomes devoid of taints through the intake of pure food. All the sense organs are tranquilized and Sattva is enhanced." (Bhavas. Up. IV/15; p. 348).

Pasupat Upanisad supports the above concept thus :

अभक्ष्यस्य निवृत्या तु विशुद्धं हृहयं भवेत् ।।
आहारशुद्धौ चित्तस्य विशुद्धिर्भवति स्वता ।।
पाशु. उ. 36: (41)

"Let the heart be purified by abandoning the unwholesome food (for) the purification of food itself leads to purification of citta." (Pasupat. Br. Up. Uttarkands, 36).

It is now interesting to see that human beinge are also classified into three categories according to their personality traits Shrimadbhagwata states how to identify them :

पुरुषं सत्वसंयुक्तमनुमीयाच्छमादिभि: ॥
कामादिभी रजोयुक्तं क्रोधाद्यैस्तमसा युतम ॥
भाग. 11 : 25; 9.

"From virtues like self-control one should conclude a man to be endowed (predominantly) with sattva from passion etc. one should know him to be (principally) full of Rajas and from anger and other characteristics he should infer him to be full of Tamas." (Shrimad Bhagwad 11 : 25; 9).

These concepts find ample mention in Smritis, Puranas and several Hathayogic texts like Hatha Pradipika, Gheranda Samhita etc.

v) Human Experiment

Before closing the review of the concept of food on mind as advocated by the ancient sages it is interesting to note that these philosophical concepts were verified by actual human experimentations : a concept which even to-day may be considered novel.

Svetaketu, son of Uddalaka wanted to know how the food affects the mind. To understand this his father asked him to fast for fifteen days. The story is reproduced below from Ch. Up. VI vii. 6.

"A person, my dear, consists of sixteen parts. Do not eat (any food) for fifteen days, but drink as much water as you like. Since the water consists of prana, it will not be cut off if you drink water."

Svetaketu did not eat (any food) for fifteen days. Then he came to his father and said "what, Sir, shall I recite ?" His father said "The Rik, Yajus and Samam verses". He replied : "They do not occur to me, Sir." He could not remember the Vedas.

In short according to ancient scriptures food must not be seen simply as 'matter' which supplies energy and the molecular building blocks to the body. According to ancient Indian thinking, food apart from nutrition is intimately concerned with the person's mind and his activities, his thought processes, learning ability, tendencies and mental make-up and should be chosen according to the goal one wishes to attain.

Sages and Rishis involved in spiritual attainment desired the preponderance of 'Sattva' in them and so were advised 'Sattvic food', where as those needing muscular effort and activity were advised 'Rajasic food' A very rational and pragmatic advise indeed.

III. Recent Trends in Nutrition Research :

Almost till a decade back nutrition scientist in the west were concerned mostly with the role of nutrients as molecular building blocks of body systems. There were hardly any studies on diet affecting the brain and mind.

Only recently the effect of nutrients on brain function has been engaging the attention of scientists in the West. In a recent article Wurtman (1982) reports that nutrients when taken as food or in the pure form can alter the chemical composition of structures in the brain so as to modify brain function.

i) Food intake and daily rhythms :

This interest in relationship of nutrient administration to brain function was kindled by a seemingly unrelated observation that there are daily rhythms in the plasma levels of amino acids; when people eat at the usual time–the concentration of amino-acids in blood plasma changes predictably in ways that depends on what food is eaten.

Two Questions :

These observations pose two important questions :

a) Do the changes have any functional significance ?

b) Whether the concentration of circulating nutrients have any effect on the rate at which nutrients are converted into cellular constituents?

Investigations into these questions has led to some significant observations. Studies have been undertaken to relate :

a) Amount of nutrient ingested to its level in blood plasma :

b) to its level in the brain, and

c) to its effect on nerve transmission.

To understand these concepts better, a brief review of the physiological process involved will be in order.

ii) Physiological Considerations :

All food items have in varying proportions, the following important constituents viz., Proteins, Carbohydrates, Fat, Minerals and Vitamins. Amino-acids are important parts of proteins. The amino-acids after absorption get converted to Neurotransmitters (N. T.) which are conveyed in the blood to the brain, and produce varying responses. The amino-acids and nutrients which have received considerable attention are:

a) Two amino acids : **Tryptophan and Tyrosine.** These are present in proteins and as such are present in most foods, and :

b) Choline : It is a component of lecithin. Eggyolk, liver and soyabeans are rich sources of lecithin.

Tryptophan, tyrosine and choline are **precursors** of neuro-transmitter (N. T.) substances that are released from a neurone or nerve cell when it fires i. e. when it is activated.

iii) Steps in Synthesis

These precursors are transformed into neurotransmitters as follows :

a) Tryptophan – 5 Hydroxy tryptophan (Enzyme) SEROTONIN (Neurotransmitter).

b) Tyrosine (enzyme tyrosine hydroylase) – DOPA – Dopamine – Norepinephrine – Epinephrine (N. T.)

Note : Dopamine, Nor epinephrine and Epinephrine are together called **Catecholamines.**

c) Lecithin – Choline COA transferase (enzyme) – Acetylcholine – cholinesterase (Ch. E.)

Thus an enzyme is always involved in the conversion of a **precursor** molecule (Tryptophan, Tyrosine, Choline) to the corresponding **neurotransmitters;** viz. (a) SEROTONIN, (b) CATECHOLAMINES, (c) ACETYLCHOLINE. The neuro-transmitter thus synthesized then conveys the nerve impulse across a synapse to either another neuron, a muscle cell, a secretory cell or some end organs.

The number of 'Chemical messenger' systems known to exist in the brain has expanded dramatically in recent years, specially with the discovery of a new family of 'neuro-peptides'.

Considerable research work has been done in recent years in idendtifying various transmitters, and in mapping their distribution in the brain.

iv) Absorption and Transport of Nutrient :

It has been shown that after absorption and entry into the blood stream, the enhancement of plasma level and availability to the brain depends on many factors. There is an **interaction** between the amounts of nutrient administered. For example, the amount of tryptophan available to the brain for conversion to serotonin depends not only on the amount of tryptophan ingested, but also **on the ratio** of plasma tryptophan to plasma levels of five other amino acids. viz., tyrosine phenylaianlne, leucine, isoleucine and valine. The conversion of tryptophan to serotonin is also influenced by the **level of carbohydrates** in the diet. It has been suggested that serotonergic **neurons** in the brain act as **sensors of plasma tryptophan ratio,** which increases serotonin release after a carbohydrate meal and reduces it after a high protein meal. David Ashley and Anderson of the university of Toronto, Faculty of Medicine have shown that an animal chooses one food in prefrence to another by exploiting this property of the serotonergic neurons.

Wurtman et al. (1983) at M. I. T. Boston have shown that increased supply of nutrient increases the level of choline and tyrosine. However, the increase in their level varies with the neuron's firing frequency and can lead to changes in that frequency. Choline and tyrosine can, therefore, amplify neurotransmission selectively, increasing it at some synapses but not at others. It has been possible to develop novel therapeutic agents, using this selectivity.

v) Nutrient Transport :

Having seen the influence of interaction of amino acide on absorption and the selectivity of neurons, it is necessary to see if **other conditions** have to be satisfied before transpart is possible.

Briefly before a nutrient can increase the level of neurotransmitter in the brain, the following conditions must be met :

a) The consumption of food must significantly increase the plasma level of the nutrient.

b) The nutrient precursor must pass the blood brain barrier.

c) The neuronal enzyme responsible for the conversion should be of low affinity.

d) The enzyme must not be susceptible to feed-back inhibition.

If any of these conditions are not met the neurotransmitter synthesis cannot take place.

There is convincing experimental proof that all these conditions are met in the synthesis of serotonin, acetylcholine and catecholamines. The large amino-acid molecules cross the **blood brain barrier** with the help of 'carrier-molecules' i. e. by active transport. These conditions are also met in the case of histamine and glycine.

Thus it is safe to assume that an increase in the brain level of a precursor enhances the synthesis of the corresponding neuro-transmitter product.

vi) Release of Neuro-Transmitter

It is now legitimate to pose a question whether an increase in synthesis of neurotransmitter necessarily leads to increased transmission across the synapse? There is enough experimental evidence to show that increased synthesis leads to increased liberation of neuro-transmitter substance.

These experiments led to two conclusions :

a) A nutrient molecule which acts as a precursor can not only enhance the release of the neurotransmitter, but can also amplify the effect on post synaptic cells.

b) The magnitude of choline's effect varies with the firing requency of the neuron on which it acts.

It has been shown that administration of choline enhance the synthesis of Acetylcholine in the brain and administration of tyrosine raises the synthesis of catecholamines.

In summary these observations suggest :

i) Giving a precursor nutrient molecule enhances the release of neurotransmitter and amplifies the neuronal signal.

ii) The magnitude of choline's effect varies with the firing frequency of the neuron on which it acts.

vii) **Anatomical Localization of Neurotransmitter** :

Since neurotransmittes are closely related to function it is necessary to know their selectively anatomical localization and functional aspects of those brain areas. The super imposition of diverse chemically coded systems on neuronal circuits gives the brain an extra dimension of modulating and specifying activity. Research has shown that nutrient precursors can enhance or modify the chemical transmission between the neurons, resulting in influencing behaviour and may even result in mental illness.

Selective staining techniques and radio active labelled molecules have provided us with a flood of information regarding anatomical distribution of the transmitters in the brain. The transmitters have been shown to be highly localized in discrete centres and pathways in the brain. The best mapped are norepinephrine, dopamine and serotonin.

Norepinephrine containing cells are concentrated in the brain stem in the **locus coerulens**' and the axons are projected to the **hypothalamus cerebellum** and the **forebrain.** The NE – system is concerned with the maintenance of **arousal, dreaming, sleep** and in **regulation of mood.**

The **dopaminergic neurons** are concentrated in the mid brain (substantia nigra and ventral tegmentum). Their axons project to the forebrain and regulate **emotional responses.**

Other **dopamine fibres** terminate in the **corpus striatum** and play a vital role in the control of **complex**

muscular movement. The degeneration of this system leads to disease condition know as Parkinsonism.

Serotonin is concentrated in the 'raphe nuclei' in the brain stem and the neurons project mainly to the **hypothalams** and **thalamalus** and other brain regions. It is concerned with **temparature regulation, sensory perception** and **onset of sleep** and **mood.**

Acetylcholine has very wide ranging functions and affects, **neuro–muscular junctions, secretory gland cells** and several synapses in the central and autonomic nervous system.

To sum up these observations : The transmission of an impulse requires – transmitter synthesis, storage, release, reaction with receptors and termination of transmitter action.

Each of these steps can be enhanced or specifically blocked by nutrient precursors or drugs. The research has provided information about the action of 'psycho–active drugs' some 'mental disorders' and more recently their effect on 'Behaviour'.

IV Therapeutic Applications

1) It has been shown in well controlled clinical trials carried out at Standford College of Medicine and Tufts, University School of Medicine, that patients of **"tardive, dyskenesia"** benefitted considerable by administration of **choline.**

2) **Choline** is also being tried in **memory disorders** of elderly people and the results are so far satisfactory.

Tyrosine in the diet has been found to be useful in the management of **blood pressure** and also **shock.**

The results in trials of **Parkinson's Disease** also seem to be promising. Tyrosine is also been tested in the treatment of **depression.** The evidence obtained by Gelenberg at the Massachusetts General Hospital in Boston have proved to be very useful. The above observations are finding confirmation from various medical centres and may finally prove the usefulness of 'nutrient precursors' in the management of several disorders.

V. Field Trials : Food and Behaviour.

There are several reports from Western countries that in recent times **antisocial behaviour is very much on increase** specially in the young. It may also be noted that over the same years more and more young people are taking 'Junk Food'. The problem has been bothering many social Scientists and thinkers. Question being raised is – '**Is there an association between the type of diet and inereasing antisocial behaviour ?**

In a recent study by Prof. (Dr.) Stephen Schoenthaler at California on Juvenile Delequents on 70 inmates of the Security Prison in Okalahama improvement in diet over a period of three month period showed reduction by 30% in offences and marked improvement in behaviour.

Similarly a study conducted by Gwilyn Roberts at the Darland High School at North Wales showed that improvement in diet showed considerable **improvement in memory concentration,** and **non verbal I. Q.** Both the studies were scientifically planned using control groups, placebos, double blind trials and overseen by experts in the respective fields.

One is used to the idea that **intellegence is influenced** by **cultural, social** or **genetic factors. It** was difficult to believe that it is influenced by nutrition.

The results however, are convincing and cannot be brushed aside. It is felt that these researches and observations will give a new direction to thinking and approach in the field of nutrition.

SUMMARY :

The review of literature shows that the scriptures gave great importance to the effect of food on mind. Upanishads, Bhagwad Gita, Smritis and Puranas are full of reference on this point. It goes a step further and suggests that the intake and composition should be consistent with type of activity and goal one has set himself. For example, if one wishes to devote to scholarly and spiritual pursuits then one must take **'Sattavic'** food. It appears that one cannot progress in the spiritual field by subsisting on **'Tamasic'** food. A concept which has been advanced with emphasis that it is the 'subtle' element in food which goes to make the mind.

A review of modern literature also shows that it is the amino-acids in the food which affect the working of the brain and behaviour, by increasing the synthesis and release of the neurotransmitter and consequent increase in the signal leading to nerve impulse. Selective localization of various Neuron complexes in selective areas of the brain make them susceptible to modification of behaviour pattern like - sleep, mood, temperament etc. It has been shown that nutrient supplement can be successfully used in treatment of diseases and also in improving behaviour, memory and decreasing criminal tendencies.

It is interesting to note that the amount of '**neurotransmitters**' involved are in the region of micro quantities, the electrical energy involved in a synspse is in the region of millivolts. In other words the quantities and energies use are in the **region subtle**. This seems to be very much in agreement with scriptural concepts, advocated about 4000 years ago by Indian Rishis. It is difficult to understand how they came to these conclusions, none the less they are there and are very clearly stated.

It seems there is a strong case for nutrition to advocate that food not only nourishes the body but affect the mind and behaviour. This should, it is hoped, give a new direction, concept and content to nutrition research and has social relevance.

Acknowledgements :

I am deeply indebted to Swami Digambarji for very valuable suggestion in the content and planning of the article. I am also sincerely thankful to Shri O, P. Tiwari Secretary and Jt. Director of Administration for considerable encouragement and helpful suggestions.

To Mrs. A. B. Desai goes the credit of searching through ancient literature and bringing up appropriate references. I am very thankful to her for the same,

I am also thankful to Dr. M. V. Bhole, Jt. Director of Research, and Dr. M. L. Gharote, Principal, G. S. College of Yoga and Cultural Synthesis.

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Yoga–Mīmāṁsa

Vol. XXVIII Oct. 1989 No. 3

EDITORIAL NOTES

May the maker of all make this journal a success. Blessed is the name of the Lord. May He bless the workers of the Ashrama with a happy and prosperous career as servants of the world which is only the Lord Himself objectified, May He that has created us in His infinite wisdom, lead us to the light that is beyond all darkness.

+ + +

In the article. 'Effect of 10 minutes Kapalabhati on some physiological functions' by Shri Gore et al. have reported that the heart rate and the eye movements increase while pulse pressure decreases during the practice of Kapalabhati. No significant changes are found in blood pressure and EEG in respect of alpha activity.

+ + +

Mr. T. K. Bera and Dr. M. V. Rajapurkar have presented the results of biomechanical analysis of knee joint flexion during the performance of Padmasana in their article, 'Biomechanical analysis of Padmasana–A preliminary report.' They have observed that instructions based on bio-mechanical principles are helpful in maintaining a comfortable posture and they feel that techniques of asanas could be standardised on the basis of biomechanics.

+ + +

In the article, 'Adhi, Vyādhi and Pranagati – Some reflections', Shri Mahesh Dave and Dr. M. V. Bhole have

Made an attempt to understand these terms as they appear in Patanjala Yoga Sutras, Ayurveda and Tantra. They have suggested that the term 'Vyādhi' appearing in P.Y.S. I-30 could be understood as disease of the physical body by the beginners of yoga, while it should be understood as a 'Chitta-Vikshepa' by an advanced student and the latter should be taken as the meaning of the term 'Vyadhi' in yoga sutras.

The article, 'Understanding the technique and effect of Kapalabhati as found in books in Indian languages other than Sanskrit', by Mrs. J. P. Oak et. al. have presented the details of the technique and the effects of Kapalabhati as found in various books written in Six Indian languages. Sanskrit books were found to give very limited and scriptic information in this regard. However, some questions raised by the authors remain unanswered and a need for further study becomes evident.

+ + +

May the Lord give us strength to carry on this work. May He ever widen the circle of our sympathisers and thus allow us to serve His Children to the best of our ability.

Dated : 15 Nov. 89.

Yoga Mimamsa Vol. XXVIII, No. 3. pp. 1 to 11, July 1989.

Effect of 10 minutes Kapalabhati on some Physiological Functions*

Gore, M. M.[**]
Gharote, M. L[***]
Rajapurkar, M. V.[****]

Abstract :

Physiological functions were studied in 12 healthy and trained subjects before, during and after 10 minutes Kapalabhati (KB) on 8 channel polygraph.

Heart rate and Eye movements increased and finger pulse volume decreased significantly during KB. No significant change was found in EEG and Blood-pressure. An apneic condition was observed immediately after KB.

Introduction :

Kapalabhati (KB) is one of the six cleansing processes mentioned in Hatha Yoga (5). ● KB consists of fast and forceful abdominal breathing which is done voluntarily at the rate of 120 breaths/min. KB also constitutes a part of Bhastrika Pranayama (8).

●Figures in brackets indicate Reference numbers.

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[*] Paper was presented in 34th Annual Conference of APPI in Dec, 1988.

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The rate and depth of respiration can influence various circulatory and nervous functions. Previous studies on one minute KB (4) revealed significant changes in Heart Rate (HR) and Finger Pulse volume (PTG). The EEG changes were insignificant. It was therefore thought that studies on KB, performed for a longer duration may yield valuable information regarding EEG changes, blood pressure, PTG and HR.

Review of Literature :

Very few studies have been reported so far in respect of the effect of KB on these body functions. **Wenger and Bagchi** (1) did not find any abnormality in EEG during KB for 5 minutes. He has not mentioned clearly about alpha activity. **Shrikrishna** (12) has reported increased amplitude and activity of alpha during 5 and 15 min. KB. He has also reported an increase in HR during KB and decrease in RR immediately after KB. **E. Roldan** (10) did not observe significant change in EEG except an increase in power peaks of alpha during KB. **Gore** (4) has observed a significant reduction in finger pulse volume and marginal reduction in Alpha percentage during 1 minute KB.

Materials and Methods :

Study was carried out on 12 healthy students (7 males and 5 females) in the age group of 23 to 35, of G. S. College of Yoga, Kaivalyadhama, Lonavla. They had been trained in KB technique and other yogic practices for 9 months. They used to practise KB for longer durations upto 10 minutes and even more, under the supervision of the first author for one month before the experiment. The technique of KB followed, was as described by Swami Kuvalayananda (8). Experiments were carried out in the morning when subjects reported on empty stomach.

The subject was allowed to sit in Padmasana or Ardhapadmasana. The rate of breathing in KB was maintained around 120 breaths/min. The exhalatory stroke was given around and slightly below the navel region of the abdomen. The eyes were closed through out the experiment. The force of breathing was kept almost uniform by the subjects throughout the practice.

Following parameters were studied before during, and after KB of 10 minutes duration. 8 channel polygraph system of Nihon Kohden was used. Polygraphic record was obtained before KB, at 1st, 3rd, 5th, 7th and 10th min. during KB and after KB upto 3 minutes.

1. EEG : Right and left parieto-occipital areas ($P_3 - O_1$ and $P_4 - O_2$) specifically for alpha activity and the frontal areas (left F_p1–F_3 and Right F_p2–F_4) were studied by using 10–20 system of electrode placement.

2. ECG : Lead IInd was used for the measurement of Heart Rate (HR)

3. PTG : Finger plethysmography – Pulse volume – was recorded with the help of Reflection type of transducer attached to the terminal phalynx of the left index finger.

4. RR : Respiratory rate was recorded with the help of Respiration pick up, fixed inside the dominant nostril.

5. EM : Eye movements were recorded from the left occular muscles (3)

6. BP : Blood pressure was measured separately from right arm by digital blood pressure apparatus.

7. Subjective Feelings : Subjects were asked to write down their experiences and feelings during the experiment. They were free to express in their own style in Hindi or English language.

Calibration : The machine was calibrated at 50 μV equal to 10 mm amplitude. This was common to all the parameters except Eye Movements, Plethysmography and Respiration rate. For EM 50 μV was equal to 5 mm height and pen deflection of 2 to 3 cms was kept for PTG & RR. Paper speed was constant at 25 mm per second.

Control : Three minutes recording obtained before KB served as control.

Statistical Analysis :

Data was statistically analysed by using ANOVA test. Comparisons between two means were done by using follow up test and relationship between different physiological functions was found out by using product moment co-efficient of correlation.

Results and Observations :

Results are presented in Tables 1 and 2.

1. **Heart Rate (HR) :** It was observed that HR increased significantly in the 1st and 3rd minutes of KB. It

TABLE - 2.

Percentage-wise analysis of the Effect

Parameter	At the end of 1st min. of KB	At the end of 3rd min. of KB	At the end 5th min. of
	100	92	93
HR/min.	0	8	17
RR/min.	100	100	100
	–	–	–
PTG (mm)	–	–	–
EM/min.	8	8	0
	83	33	92
Alpha % LPO	83	58	67
Alpha % RPO	0	25	17
	8	8	8
Systolic Bl. Pressur	83	83	75
Diastolic Bl. Pressur	75	83	75
	17	17	25
Pulse Pressure	58	42	58
	33	50	25

te % of number of subjects.

TABLE : 1

Comparisons of Initial means with the values during Kapalabhati at different time intervals and Immediately after Kapalabhati

Parameters	Before Kapalabhati (KB)		At the end of 1st min. of KB		At the end of 3rd min. of KB		At the end of 5th min of KB		At the end of 7th min. of KB		At the end of 10th min. of KB		Immediately after Kapalabhati.	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD.
HR/min.	80	± 13	**100	± 15	*95	± 19	92	± 17	92	± 15	92	± 16	81	± 9
RR/min.	20	± 5	125	± 7	126	± 8	121	± 7	125	± 7	126	± 7	10	± 4
PTG (mm)	17	± 6	12	± 5	12	± 4	**11	± 5	*11	± 4	**10	± 5	13	± 8
EM/min.	11	± 5	*20	± 6	16	± 6	15	± 6	15	± 5	*17	± 7	10	± 7
Alpha % LPO	67.92	± 22.93	55.92	± 25.37	55.50	± 23.75	56.33	± 24.74	51.25	± 26.30	57.08	± 24.54	62.63	± 27.72
Alpha % RPO	69.58	± 23.03	58.42	± 24.03	57.17	± 22.46	58.00	± 23.45	52.92	± 23.98	58.33	± 23.68	65.13	± 27.93
Systolic Bl. Pressure	115	± 8	122	± 7	124	± 13	124	± 15	125	± 16	121	± 17	113	± 8
Diastolic Bl. Pressure	78	± 13	80	± 11	80	± 9	81	± 10	82	± 7	84	± 8	81	± 9
Pulse Pressure	37	± 16	42	± 11	44	± 13	43	± 19	43	± 18	37	± 19	32	± 14

Level of Significance : * = 5%; ** = 1%; *** = 0.1%. Other results are not significant. N = 12.

TABLE – 2.

Percentage–wise analysis of the Effect of Kapalabhati

Parameters	Results	At the end of 1st min. of KB	At the end of 3rd min. of KB	At the end of 5th min. of KB	At the end of 7th min. of KB	At the end of 10th min. of KB	Immediately after Kapalabhati
HR	Increase	100	92	93	92	92	50
	Decrease	0	8	17	8	8	50
RR RR	Increase	100	100	100	100	100	0
	Decrease	–	–	–	–	–	33
	Apnea	–	–	–	–	–	67
PTG	Increase	8	8	0	0	0	17
	Decrease	83	33	92	83	100	75
EM	Increase	83	58	67	67	67	33
	Decrease	0	25	17	17	17	50
Alpha %	Increase	8	8	8	8	25	25
	Decrease	83	83	75	92	67	67
Systolic Blood Pressure	Increase	75	83	75	75	67	67
	Decrease	17	17	25	25	33	25
Diastolic Blood Pressure	Increase	58	42	58	67	67	75
	Decrease	33	50	25	33	17	25

Figures indicate % of number of subjects.

5. EM : Eye mo
occular r

6. BP : Blood p
right arn

7. Subjec- Subjects
tive experien
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lings : style in

Calibration : The mac
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Statistical Analysis :

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Percentage-wise analysis of the Effe

At the end of 1st min. of KB	At the end of 3rd min. of KB	At the end of 5th min. of
100	92	93
0	8	17
100	100	100
–	–	–
–	–	–
8	8	0
83	33	92
83	58	67
0	25	17
8	8	8
83	83	75
75	83	75
17	17	25
58	42	58
33	50	25

ate % of number of subjects.

reduced slightly in 5th minute of KB and got stabilized around 92 beats/min up to 10th min. It came to normal within one min. after KB.

2. Respiratory Rate (RR) :

The rate of breathing was regulated voluntarily by the subjects around 120 breaths/minute during KB. When KB practice was stopped, RR was seen decreasing significantly by 6 to 12 breaths/min. An apneic condition was also seen to develop in 8 out of 12 subjects. The duration of this apneic condition was from 10 to 50 seconds in different subjects. 4 subjects who did not develop apnea immediately after KB, showed reduction in their RR by 2 to 3 breaths/min. Breathing came to normal pattern within 3 min. after KB in all the subjects.

3. Finger Plethysmograph (PTG) :

Finger pulse volume decreased as soon as KB was started in all the subjects except one and this reduction in PTG was observed throughout the practice of KB. The reduction in PTG was maximum and significant in 5th, 7th and 10th min. of KB. The reduction in PTG persisted even after KB, upto 3 minutes in 8 subjects while upto 1 min. after KB in 4 subjects. This indicates reduction in peripheral blood flow during KB. An analysis for co-efficient of correlation indicates that when HR is increasing in KB, PTG is decreasing and after KB, PTG is increasing while HR is coming to normal.

4. Eye Movements (EM) :

Eye movements increased significantly in 1st min. of KB and then reduced slightly from 3rd minute upto

7th min. of KB. EM increased again in 10th min. of KB. After KB, EM decreased slightly over the initial value, i.e before KB. Correlation between Alpha% and eye movements is clear in 10th minute of KB, where EM are increasing and Alpha is decreasing. After KB, EM are decreasing and Alph % is coming to normal level.

5. **EEG : ALPHA % :**

Alpha activity decreased slightly during KB which was not statistically significant. In 3 subjects, waves having frequency of 6 -- 7 cycles/sec. appeared during and immediately after KB.

Frequency of alpha waves did not change at all.

Amplitude decreased marginally by 5 to 7 micro-volts-during 10th min. of KB. When RR is increased the amplitude is decreased. After KB, RR is decreasing, while alpha emplitude is increasing.

Other waves like Delta or Theta did not appear during or after KB.

6. **Blood Pressure (BP) :**

Mild inerease in systolic BP by 6 to 10 mmHg and in Diastolic BP by 2 to 6 mmHg was observed during KB but it was not statistically significant. This indicates that there is no extra load on the cardiovascular system due to voluntary breathing in KB.

7. **Subjective feelings :**

1. Most of the subjects, inspite of their training and practice of KB for so many days, expressed their difficulty to continue co-ordination between abdominal

movements and exhalation. They also explained that their awareness was shifting from nose or fore–head to navel region in an attempt to achieve this co-ordination and to maintain it along with proper speed and depth of breathing.

2. The subjects in whom the apnea was developed immediately after stopping KB, have described that they did not feel like inhaling or exhaling for a long time and felt very calm and quiet after stopping KB.

3. Most of them have experienced lightness in the body. some of them have expressed numbness in legs while still others have explained some tension in the forehead during KB.

4. No body has expressed tiredness after KB.

Discussion :

A mild tachycardia was observed during KB. This observation is in agreement with the findings of other workers (1, 4, 10). Heart rate (HR) came back to normal within 1 minute after stopping KB.

Significant decrease in Respiratory Rate (RR) indicates that KB has a quieting effect on respiratory centre. This inhibitory action on the respiratory centre and an apneic condition found in 8 subjects may be due to CO_2 wash out from the blood. The respiratory centre becomes active again when PCO_2 level comes back to normal. **Bhole** (2) and **Joshi** (7) have shown that breath holding time could be increased easily if practiced immediately after KB. **Swami Kuvalayananda** has described the technique of Bhastrika Pranayama where KB is immediately followed by one round of Purak, Kumbhaka and Rechaka (8). Our observations so far support the utility of KB in his technique of Bhastrika

Pranayama. These findings are also in agreement with our previous observations on KB by spirometry (5).

The most interesting finding from PTG (See Fig. 1,2) that the peripheral blood flow decreases during KB, inspite of an increase in HR and BP, indicates peripheral vasoconstriction. This finding suggests possible re-distribution of criculation. However, further study is required to investigate such possible alteration in regional blood flow. It may be due to splanchnic stimulation resulting from abdominal strokes and therefore an increased release of adrenaline in circulation. **H. Ricckert** (9) found that finger pulse volume decreased but fore-arm blood volume increased during TM practice. However, Wenger (1) has found an increase in PTG during 15 min. KB.

Hyperventilation (HV) which is close to KB but not identical, is known to produce abnormal EEG changes if prolonged for more than 5 minutes (1, 13). **Kraaier V.** (13) has found that during standard HV there was a relative increase in slow activity (1–7Hz). Alpha activity recorded from P4 O2 area was prominently decreased. He has also explained that HV gives rise to a decrease in arterial P CO_2, leading to Vaso-constriction of arteriolar channels and as a consequence a decrease in cerebral blood flow. This further leads to cerebral tissue hypoxia and CT lactic acidosis which affects EEG. This sort of abnormal change in EEG was not observed in KB of 10 minutes duration eventhough RR was high. The specific technique of rapid breathing used in KB, therefore, seems to be more physiological, harmless and safer.

Alpha activity is an index of rest and conscious relaxation of mind. A mild reduction in alpha activity during KB indicates mild mental activity. It may be due to mental efforts to coordinate the exhalatory phase (and force) and the inward movement of the abdomen. When KB is stopped, this mental activity is reduced and alpha activity is restored at normal level again. Any mental concentration or efforts to direct attention towards one object i.e. concentration can elicit alpha block or desynchronization.

Movement of the eye balls is an indication of unsteady mind or changing focus of attention. Increased eye movements in KB indicate efforts of individual to co-orddinate forceful exhalation and the inward movement of the abdomen. The subjects were trained in KB for more than 6 months and it was expected that their eye movements would be minimum during KB. The present results indicate that they are yet to get proficiency or mastery over the technique of KB. It is felt therefore that during properly done KB by highly trained subjects the eye movements would not increase, as the sujects will be more stable and relaxed. Subjective feelings obtained from the subjects support these observations.

Conclusion :

Within the limitations of the present study it may be concluded that the practice of KB of even 10 minutes duration does not produce any abnormal changes in the body. The changes in blood circulation, heart rate, respiratory rate and blood pressure are within the normal physiological limits. The subjects did not feel tired or exhausted after KB practice on the contrary they felt light, calm and quiet in their mind irrespective of the duration of KB. This information could be of interest to the yoga students and teachers who would employ the technique for different purposes. Consistency and regular practice of KB for a considerably long period would bring proficiency in the technique. The technique described by Swami Kuvalayanada appears physiologically harmless and safer, even for longer durations.

Acknowledgements :

Authors are thankful to Rev. Swami Digambarji, Director, Shri O. P. Tiwari, Joint Director of Administration and Dr. M. V. Bhole, Joint Director of Research for their encouragement. The technical help of Shri D. G. Jamadagni and the statistical work by Miss Meena Deshmukh is also thankfully acknowledged. Thanks are due to all the subjects who volunteered for the experimental work sincerely

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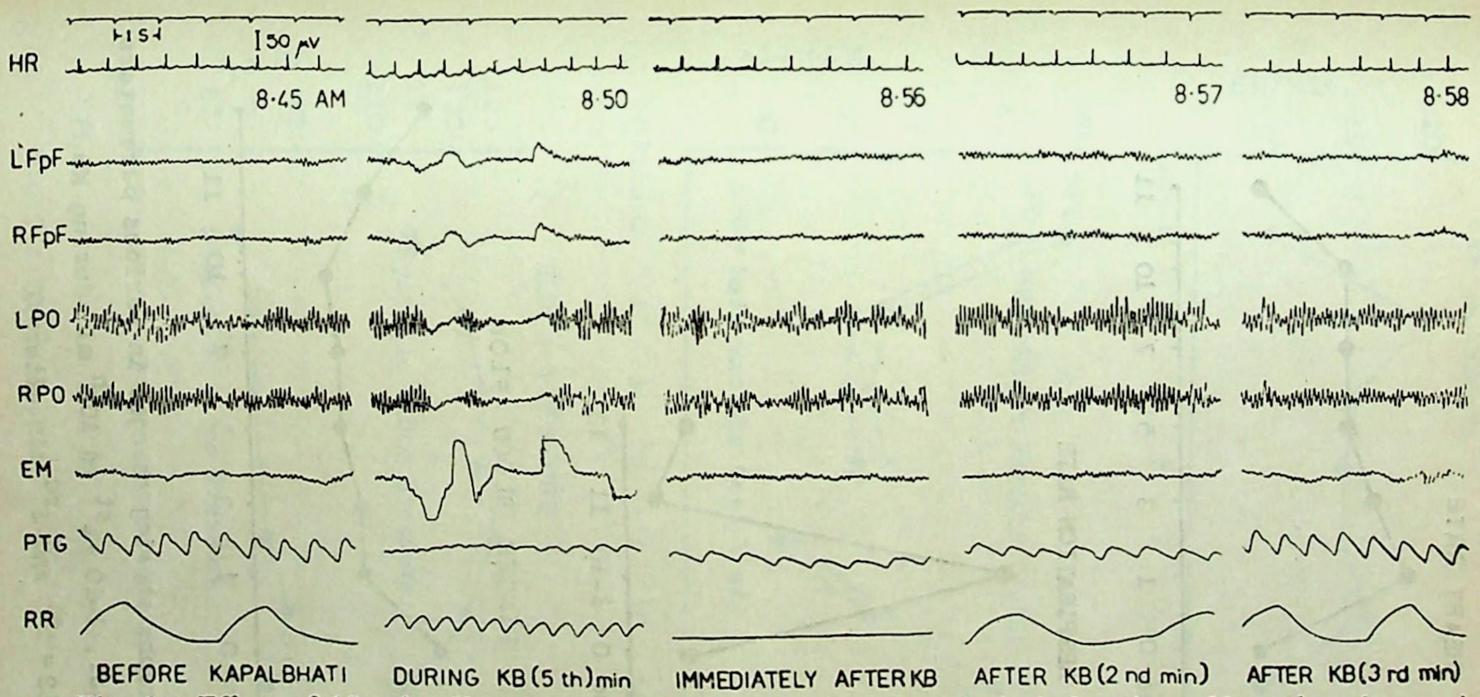

Fig. 1 : Effect of 10 min. Kapalbhati (KB) on various physiological functions. Note the change in Heart Rate (HR), Eye Movements (EM), Finger pulse volume (PTG) during KB. Apnea is seen immediately after KB. EM is reflecting on frontal EEG leads (LF_pF & RF_pF) also. The functions are coming to normal level in 3rd min. after KB.

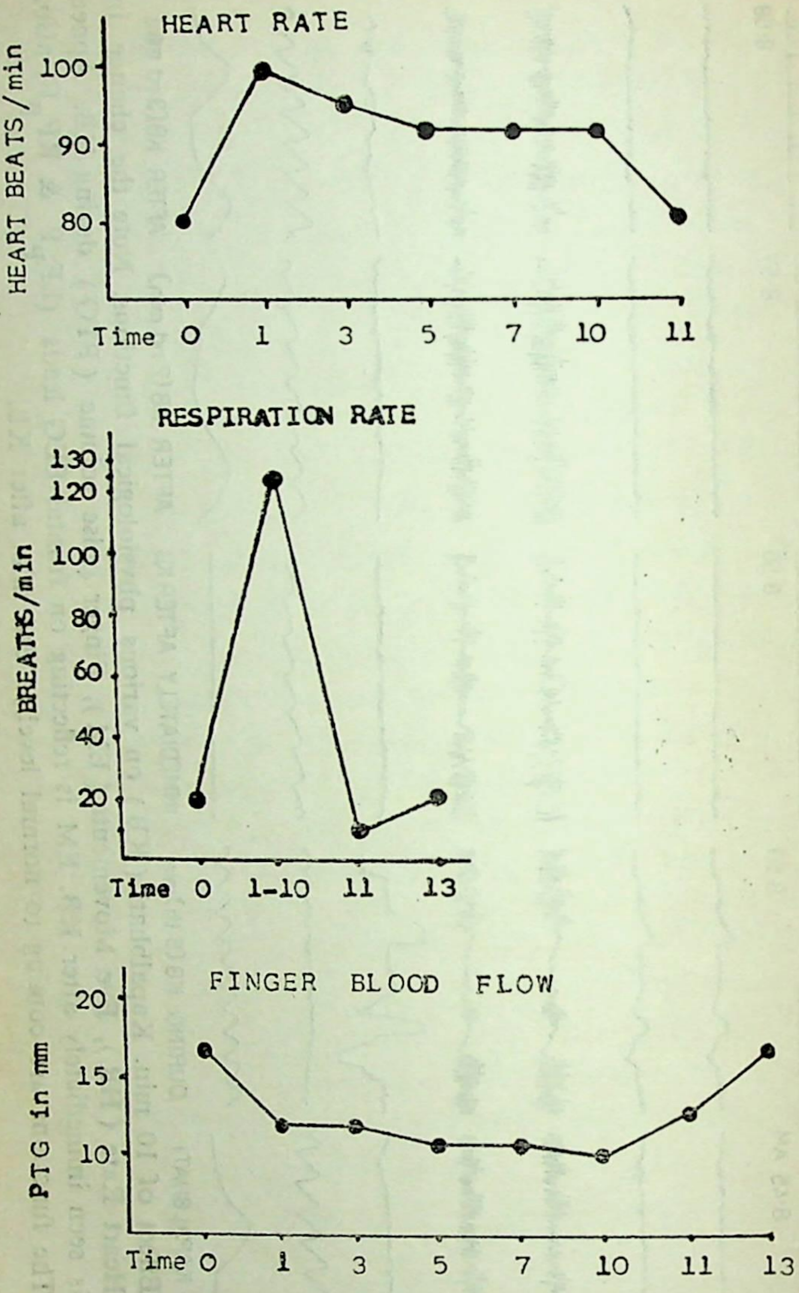

Fig 2 : Graphs showing changes in various parameters
0 = Initial, 1-10 = 1st to 10th min during KB
11 and 13 = 1st and 3rd min after KB

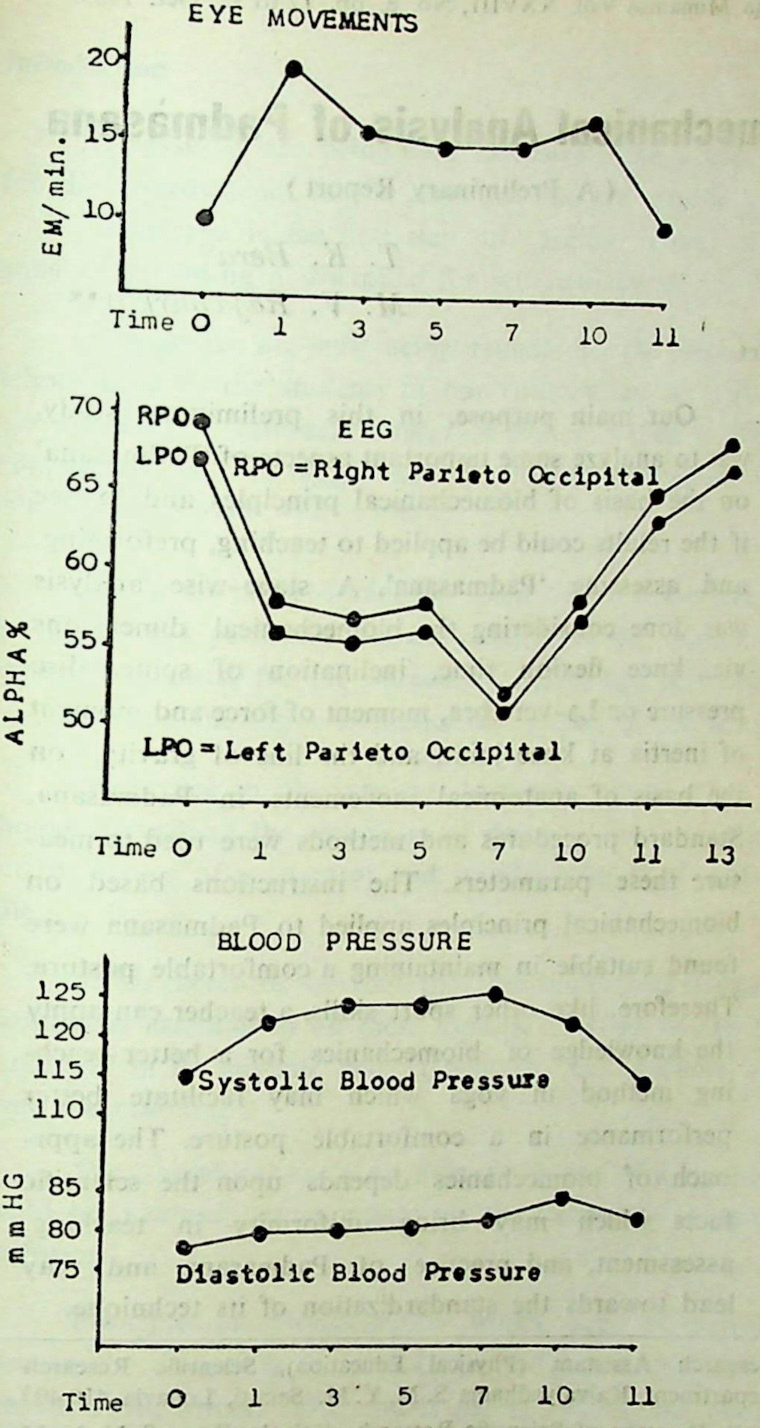

Fig 2 : Continued

Yoga Mimamsa Vol. XXVIII, No. 3, pp. 12 to 32 Oct. 1989.

Biomechanical Analysis of Padmasana

(A Preliminary Report)

*T. K. Bera**
*M. V. Rajapurkar***

Abstract

Our main purpose, in this preliminary study, was to analyze some important aspects of 'Padmasana' on the basis of biomechanical principles and to see if the relults could be applied to teaching, preforming, and assessing 'Padmasana'. A stage-wise analysis was done considering the biomechanical dimensions viz., knee flexion time, inclination of spine, disc pressure on L3-vertebra, moment of force and moment of inertia at knee joint, and the line of gravity, on the basis of anatomical movements in Padmasana. Standard procedures and methods were used to measure these parameters. The instructions based on biomechanical principles applied to Padmasana were found suitable in maintaining a comfortable posture. Therefore, like other sport skills, a teacher can apply the knowledge of biomechanics for a better teaching method in yoga which may facilitate better performance in a comfortable posture. The approach of biomechanics depends upon the scientific facts which may bring uniformity in teaching, assessment, and practice of Padmasana and may lead towards the standardization of its technique.

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Introduction

Yogasanas are being used extensively the world over for the improvement of the physique and the psyche.

Yogasana is the first step of 'Hatha Yoga' which aims at providing a discipline for self-realization.

Yogasanas are now being taught at the secondary school level to the students of our country as a part of Government's National Education Policy (1986). Thus, 'Yogasanas' will be taught and practised throughout the country on a very wide scale.

As in all other disciplines when the practices are to be taught and performed on an extensive scale, standardization is essential for the purposes of teaching, performing and assessing the ultimate proficiency gained in the art.

Reference to the ancient literature shows that it, though describing the technique of doing Asana, is silent on the scores of assessment and standardization of technique.

It is, therefore, obvious that uniformity and standardization is essential in all these aspects, if Yoga has to be successful in its mission, when taught to our students all over the country.

We, therefore, made an attempt to see, if a method could be evolved to standardize the various 'Asanas' performed.

Principles of biomechanics which are extensively used in the disciplines of sport (Hay, 1973; Arnold, 1975; Jenson, 1978; Miller, 1978; and Atwater, 1980), we thought, could be applied to Asanas as well.

In the first instance we have tried to analyze some of the important aspects of 'Padmasana' in terms of biomechanics and to see if the results could be applied to teaching, performance, and assessment of Padmasana,

Methods

The technique of 'Padmasana' has been described in several Yogic Texts such as 'Hathapradipika' (Digambarji *et al.*, 1970), 'Asanas' (Kuvalayananda, 1982), and 'Yogasanas' (NCERT, 1983). The technique of 'Padmasana' taken for biomechanical analysis is as described recently by NCERT (1983).

According to this technique, 'Padmasana' is performed through seven stages. A stage-wise analysis of 'Padmasana' has been done in terms of biomechanical principles (Fig. 1, 2, 3, 4, 5 & 6).

The biomechanical dimensions such as knee flexion time, inclination of spine, disc pressure on L3 – vertebra, moment of force and moment of inertia at knee joint, line of gravity, and ultimately the maintenance of posture were taken into consideration on the basis of anatomical movement in 'Padmasana'. These biomechanical dimensions were assessed as follows :

1. **Normal knee flexion time** (in Secs.) of an individual subject was calculated using laws of motion as referred to the Equations No. 3, 4, & 5 (Gambhir *et al.*, 1984).

2. **Inclination of spine** (in Degree) was found out in terms of angle against a vertical line drawn on the wall.

3. **Disc Pressure** (in Newton–Meter) on L3–Vertebra was found out by applying the principle of lever (Wirhed, 1984). It can also be calculated with the help of Equation No. 6.
4. **Moment of Force and Inertia** (in Newton–Meter) of knee joint were calculated by considering some anthropometric measurements as refered to the Equation Nos. 1 & 2 (Wirhed, 1984). The weight of the lower leg was measured (Miller *et al.*, 1973; Kirkendal, 1982; and Gambhir *et al.*, 1984) to calculate the moment of inertia.
5. At the final sitting posture, **the direction of line of gravity and the placement of the centre of Gravity** (C. G.) were determined on the basis of the inclination of the spine which can be expressed in terms of distance (in Cm.) from L3–Vertebra (Wirhed, 1984).
6. Measurement of the time between actual starting of 'Asana' and the instance when the subject is uneasy as shown by opening of the eyes or body movement is recorded by a stop watch in Sec./Min.

Instructions (such as, holding the toe instead of ankle joint during knee flexion, Knee flexion on the basis of normal time, touching the knees to the ground, and vertical inclination of spine in the final posture) were based on the biomechanical principles.

Initial study was done on six male volunteers of age group 24–27 yrs. One representative sample of analysis is presented in this article.

Biomechanical Analysis

A stage-wise analysis of Padmasana in terms of the Principles of biomechanics is given below :

Stage - 1

Padmasana is started in sitting posture with both legs extended together in forward direction.

When the knee is stretched, the two collateral ligaments are taut to prevent sideward bending of knee (Fig. 1). The anterior cruciate ligament prevents the forward movement in relation to thigh. Three knee extensors such as vastus lateralis, vastus intermedius, and vastus medialis are working concentrically (Wirhed, 1984). Other knee extensor muscles viz., quadriceps and rectus femoris are maximally shortened. Hence the head of the femur rotates within the acetabulum along the transverse axis. The anterior parts of the menisci are compressed between the femoral condyles and the tibia (Kaplan, 1958; and Evans, 1977)

In this stage, hip flexion is produced by psoas major and iliacus, assisted with pectineus, rectus femoris and sartorius muscles (williams et al., 1980).

To keep the spine erect, the flexors (Longus cervicis, Scaleni, Sternocleidomastoid and rectus abdominis of both sides) and the extensors (Spinalis thoracis, Spinalis cervicis, and Spinalis capitis) are functioning (Williams *et al.*, 1980).

The Centre of Gravity (C. G.) of each extended leg (Fig. 1) acts through the 45% of the leg's length from the hip (Wirhed, 1984).

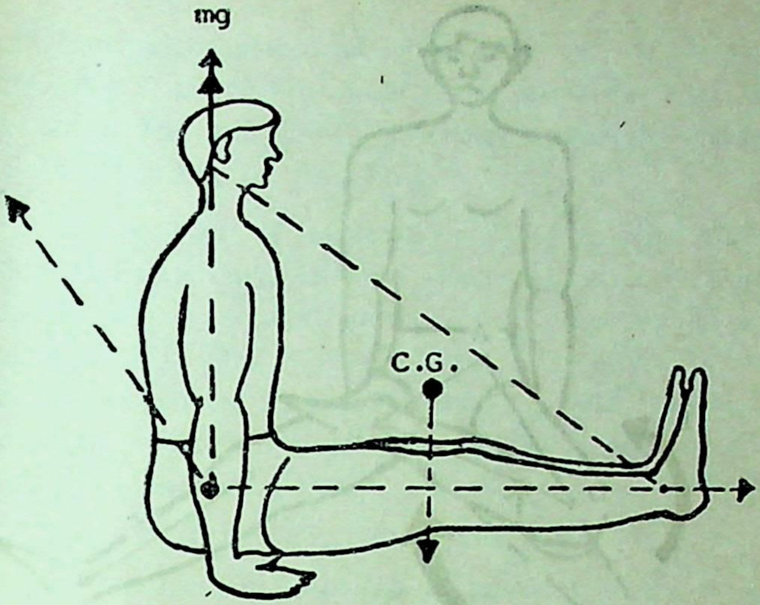

Fig. 1 C.G. of extended legs acting through 45 % of the leg's length from the hip

Stage – 2

Fold the right leg in the knee and place it in the left groin in such a way that the right heel is touching the lower part of the abdomen.

In this stage (Fig. 2), knee flexion occurs slowly. It consists of the following movements :

1. At the knee the femur rolls back on the tibia. This movement takes place until the anterior two crossed ligaments (anterior cruciate ligaments) are completely stretched.

2. After the movement stated above, the femur is gliding on the same spot on the tibia.

3. The head of the femur rotates within the acetabulum by medial axis.

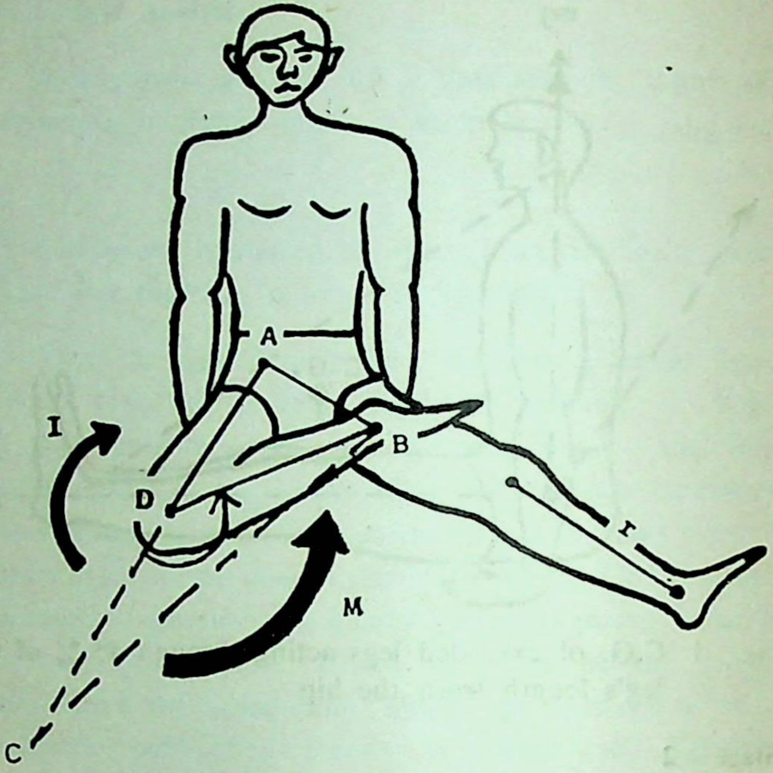

Fig. 2 Moment of Force and Moment of Inertia during acute knee flexion in transverse plane

The knee extensors (rectus femoris, vastus lateralis, vastus intermedius and vastus medialis) are stretched in Padmasana by working eccentrically during knee flexion, but the antagonistic muscles i. e., knee flexors (Bicep femoris, Semitendinosus and Semimembranosus muscles) functioning concentrically are maximally shortened. Generally it is observed that bicep–femoris helps to rotate the lower leg so that the foot points outward but Semi–tendinosus and Semi–membranosus muscles help to rotate the lower leg inwards. The lower leg usually cannot rotate as much inward as it can outwards, because the cruciate ligaments in the knee joint 'twist' around each other during inward rotation and thereby block the movement. During the placement of right heel in the opposite groin (Fig. 2), a little inward twist is observed at the right knee. The functioning collateral ligaments prevent side-ward bending on right knee.

The moment of inertia (I) acts during right knee-flexion of Padmasana. The axis of rotation is right knee joint, the length of right lower leg is 'r', and weight of right lower leg is 'm'. So the moment of inertia (I) of knee flexion can be measured (Wirhed, 1984) by the product of weight (m) of the leg and the square of the length of the lower leg (r).

i. e., $I = m\ r^2$........ (Equation No. 1)

The moment of force (M) is generated at the knee joint and differs from individual to individual. This moment of force (M) can be assessed (Wirhed, 1984).

$M = F \times d$ ....(Equation No. 2)

[Where, F = Gravitational force,

and d = Length of lower leg]

Similarly, the moment of inertia and the moment of force at the hip joint during this posture can be calculated.

Stage - 3

Fold the left leg in the knee and keep the heel in touch with the lower part of the abdomen (Fig. 3).

The anatomical motions and mechanical principles are same as per discussion in the stage - 2 of the techniqe of Padmasana.

The range of knee-flexion time which can safely be employed in carrying the heel to the opposite groin can be calculated by applying the principles of laws of motion through the following Equations (Gambhir *et al.*, 1984) :

$P = mf$ .... (Equation No. 3)

$V = u + ft$ .... (Equation No. 4)

$S = Vt$ .... .. (Equation No. 5)

[Where, P = force, m = mass, u = initial velocity
V = velocity, f = acceleration
S = distance, and t = time]

Stage - 4

Place both the hands on the respective knees, sit erect and close the eyes. Keep the knees in touch with the ground and if necessary, press them down gently by hands.

In this final posture of Padmasana the C. G. of the body acts through the middle of the triangles (Fig. 4) created by different body-parts as follows :

Fig. 3

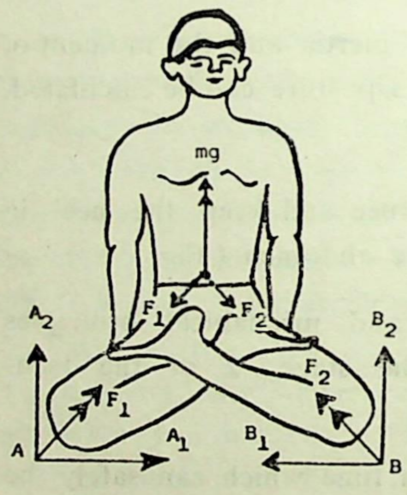

Fig. 4

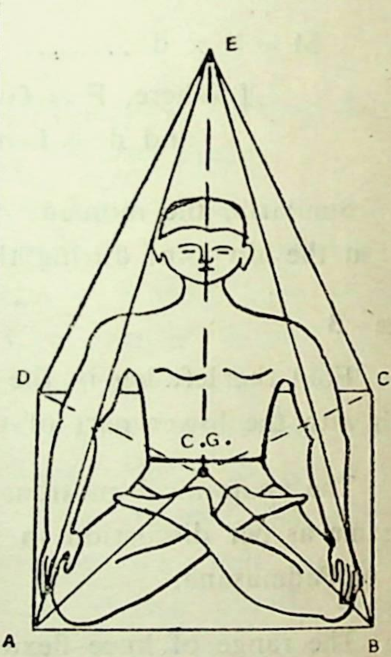

Fig. 3 Resultant and Component forces acting through knee joints

Fig. 4 C.G. of the total posture falls on the Centroid of an imaginary Pyramid

1. Left hand, right hand and distance between two knee joints.
2. Right hand, right thigh and distance between right side of hip joint to right shoulder joint.
3. Left hand, left thigh and distance between left side of the hip joint to left shoulder joint.

Finally, the resultant force of C. G. of the total body at this sitting posture acts through the middle of a pyramid (Fig. 4). This resultant force of C. G. passes about 15 cm in front of L3 – Vertebra (Wirhed, 1984). In this posture the body is maintained in the state of balance because –

1. the area of the base of support is sufficiently large (Fig. 4 : ABCD).
2. the C. G. falls within the area of the base of support (Fig. 4).
3. the C. G. comes lower and nearer to the ground.

In Padmasana, the spine is kept erect to place least amount of disc pressure on the lumbar spine which is generally calculated through the Equation No. 6 or b using the principle of lever (Wirhed, 1984).

Hence, Pressing Force (P) = mg + F………

(Equation No. 6)

[Where, mg = Body weight,

F = Contraction force surrounding the muscle]

Pressure (P) is evaluated through dividing the force (F) by the disc (e. g., disc pressure is due to the body weight acting on disc from above and the contraction force of the surrounding muscles). The L3 – Vertebra of an adult has an area of about 10 Cm^2. The disc of a young person can withstand a stress of 800 Kg i. e., 8000 N or 800 N/Cm^2 (Where, N = Newton). The ability of the discs of an older person to withstand the stress is reduced to half of this (Wirhed, 1984).

Fig. 5

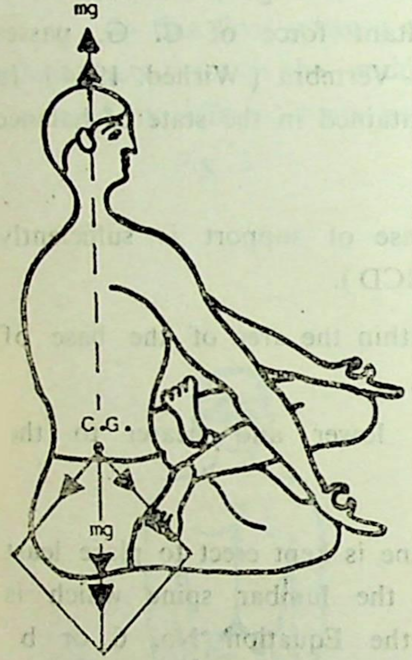

Fig. 6

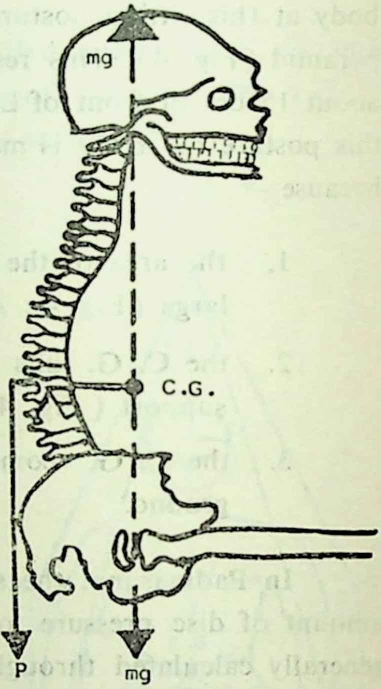

Fig. 5 Laws of Parallelogram and Newtons third law of motion acting proportionately to keep the spine erect

Fig. 6 Principle of lever showing the cause of lower back pain in the final posture of Padmasana

It is well known that Padmasana is a sitting posture which produces greater disc pressure (Pressure on the lumbar spine) than in any standing positions (Wirhed, 1984). The direction of erect spine of this posture is the resultant force of a parallelogram (Fig. 5) acting vertically upward, whereas the counter part is passing vertically downward. The muscular stability of vertebral column is achieved by the combination of anterior and posterior trunk muscles. However, the total stability of vertebral column in erect posture of spine is maintained by the six kinds of ligaments that hold the bones together in Padmasana, with the assistance of the trunk flexors, the abdominal muscles, the extensors and the deep back muscles.

Stage – 5

Open the eyes, remove the hands from the knees and place them on the ground by the side of the body.

Pressure on lumbar spine is relaxed to some extent. Body becomes more stable than the earlier stage (Fig. 3).

Stage – 6

Remove the left foot from the right thigh.

The moment of force of left knee extension can be decided as per Equation No. 2. The moment of inertia is felt comparatively less at knee joint and the pressing force on lumbar spine is also released partially. The body becomes stable as compared to the earlier stages due to the increase in surface area of the base of support and C. G. falling within this surface area. The muscles which are generally stretched and contracted gradually become relaxed (Fig. 2).

Stage – 7

Remove the right foot from the left thigh and extend it.

Biomechanical analysis is same as described in the Stage-6 (Fig. 1).

Results

The result of biomechanical measures at knee joint before and after the instructions in the performance of Padmasana are presented in the Table 1.

TABLE 1

Results of Biomechanical Analysis as Applied to Padmasana during Knee Flexion

Biomechanical Measures at the Knee Joint	without any Instruction	After Instruction based on Biomechanical Principles
Knee Flexion Time (in Secs.) :		
1. Right leg (Normal Time = 2.13 Secs.)	01.59 Secs.	02.18 Secs.
2. Left leg (Normal Time = 2.15 Secs.)	02.30 Secs.	02.25 Secs.
Moment of Force (in Nm) :		
1. Right Knee Flexion	12.00 Nm	15.60 Nm
2. Left Knee Flexion	11.92 Nm	14.28 Nm
Moment of Inertia (In Nm) :		
1. Right Knee Flexion	08.10 Nm	08.10 Nm
2. Left Knee Flexion	07.39 Nm	07.39 Nm
Total Force of Moment (in Nm) :	*	**
1. Right Knee Flexion	03.90 Nm	07.50 Nm
2. Left Knee Flexion	04.53*Nm	06.89**Nm

*While holding at the ankle joint, **While holding at the toe.

It was evident from the Table 1 that the normal knee flexion time of right leg was 2.13 secs. But without instructions, the subject was performing the flexion of right knee within 1.59 secs., which was quicker than the normal flexion time that may lead to muscle injury. Following instructions, the knee flexion time of right leg was 2.18 secs. because the normal flexion time (right knee) was calculated as 2.13 secs., which is considered to be the safest time limit. In the case of left leg, the time for knee flexion was 2.30 secs before instructions, whereas after instructions it was 2.25 secs. Although both the timings 2.30 secs and 2.25 secs synchronized with the normal flexion time (2.15 secs), yet the knee flexion time of right leg following instructions (2.18 secs) was more regularized with the normal flexion time (2.13 secs) than left leg. Therefore, the biomechanical application can be inferred to be beneficial to regulate the knee flexion time within the safest limit while performing Padmasana.

During knee flexion the subject brought the heels to the opposite groin. Here the moment of force was facilitated by knee flexor muscles and the external force was exerted by holding legs with hand although in the reference (NCERT, 1983) there is no such mention that whether the practitioner will hold the ankle or toe. Before any instructions, the subject performed knee flexion by holding ankle joint which produced less amount of force (Table 1) on the right knee as 12.00 Nm. On the other hand holding the toe, during knee flexion with the specific instructions, the subject could generate more amount of force (15.60 Nm for right knee and 14.28 Nm for left knee) which facilitates the easy movement of legs during knee flexion. The resistance during knee flexion (i. e., the moment of inertia) varies from individual to individual and even from right leg to left one. The moment of inertia observed on right knee and left knee were 8.10 Nm and 7.39 Nm respectively. The moment of inertia at the knee joint in Padmasana, performed without knowing the biomechanical principles, was found to be unchanged even after the specific instructions i. e., the value of inertia was constant.

Therefore, the total force of movement during knee flexion was very less (Right leg = 3.90 Nm, Left leg = 4.53 Nm) before instructions (i. e., while holding ankle joint), but the higher movement force was observed (Right leg = 7.50 Nm, Left leg = 6.89 Nm) after specific instructions (i. e., while holding the toe). From this result it was clear that during knee flexion in Padmasana the holding of toe is more appropriate than that of ankle hold (Table 1).

The result of different inclinations of spine with ground level in Padmasana showing the shifting of the line of gravity as well as disc pressure on L3–Vertebra is shown in Table 2. The forward inclination of spine about 85° angle with the ground level showed the shifting of the line of gravity about 24.25 Cm away from L3–Vertebra and created excessive disc pressure (1942.65 N/Cm²) which was observed prior to the specific instructions. Therefore, immediately after the final posture severe lower back pain may result. When sitting erect for Padmasana with the spine at 90° angle to the base it was seen that the line of gravity shifted to normal i. e., 15 Cm away from the L – Vertebra and the disc pressure generated in this posture was 850.8 N/Cm² as compared to 1942.65 N/Cm². Thus, the application of biomechanical principles explains the feasibility of erect spine in Padmasana. It also explains why one can sit in this posture for a longer duration of time without backache.

TABLE 2

Results of Biomcchanical Analysis as Applied to Padmasana during Inclination of Spine and Maintenance of Posture

Biomechanical Measures	Without any Instruction	After Instruction based on Biomechanical Principles
Inclination of Spine with ground level (in Degree)	85^0	90^0
Line of Gravity away from L3-Vertebra (in Cm)	24.25 Cms.	15.00 Cms.
Disc Pressure on L3-Vertebra (in N/Cm^2)	1942.65 $N/Cm.^2$	850.80 N/Cm^2.
Total duration of the Maintenance of Posture (in Min./Secs.)	11 Mins. 5 Secs.	14 Mins. 12 Secs.

The maintenance of time in Padmasana was also recorded before and after the instructions which were based on the biomechanical principles. It was found that the total duration of maintenance of the posture after the instructions (14 Mins. 12 Secs.) was higher than the posture before the instructions (11 Mins. 5 Secs.).

Discussion

The results of performing Padmasana on the basis of biomechanical principles using one representative sample is shown in Table 1. It shows that the normal limit of knee-flexion time could be regularized with the help of biomechanics to provide the safest limit of working knee joint because, during the flexion of right knee, the subject took lesser time in comparison with the normal time limit. This may lead to the muscle–or ligament injury or pain and ultimately may lead towards the feeling of discomfort.

During knee flexion in Padmasana there were no such specific rules in traditional methods as to whether the practitioner should hold the ankle joint or the toe. After analysing the technique biomechanically, it was clear that one should hold the toe rather than ankle during bringing the heels to the opposite groin, because of favourable amounts of the Moment of Force and constant values of Moment of Inertia (Table 1).

The inclination of spine in Padmasana shows direct relation with the shifting of the line of gravity (Table 2). The forward inclination of spine with the ground level causes the shifting of the line of gravity towards the front side of L3–Vertebra and ultimately generates the excessive disc pressure. Due to this excessive disc pressure, severe lower back pain may be observed immediately after the final posture which may be responsible for the feeling of uneasiness and discomfort. As a result the purpose of performing Padmasana may not be served. In this case proper instructions led to the erect condition of the spine, the normal direction of the line of gravity and the normal disc pressure on the lumbar spine (Table 2).

The main purpose of Padmasana is to sit comfortably for a very long duration of time. In this study it is important to note that the application of biomechanical principles not only gives more comfort in sitting posture of Padmasana, but is also beneficial to maintain the same for a longer duration of time as compared to the technique which they learnt earlier. Thus, the application of biomechanical principles help to explain the how and why of Padmasana on scientific basis.

Principles of biomechanics give a lot of information about the moment of force and the degree of inertia that is generated in knee joint during acute flexion at transverse plane in an attempt to touch the heel to the opposite groin, which can be, generally, understood through the Equations 1 & 2 respectively. If the moment of inertia at knee joint for a practitioner is more during acute flexion on transverse plane, it is not wise to bring the heel to the opposite groin quickly. The range of knee flexion time can safely be employed in carrying the heel to the opposite groin and can be assessed through the Equations 3, 4, & 5 respectively. It will, thus, be possible to measure the stress in the knee joint of a healthy subject who performs the Asana fully and also in the case of persons who cannot perform the same properly. It is, generally, observed that the rigid military erect posture requires more energy than a relaxed standing posture (Rasch *et al.*, 1978) Thus, it may be wise to keep the spine erect–cum–relaxed in Padmasana (Fig. 4) so that the C. G. falls within the base of support of the individual practitioner (Fig. 4). It leads to a balanced and stable position. If the C. G. falls outside, and/or if the spine is not erect cum relaxed then the person feels imbalanced and uncomfortable while doing Padmasana. Application of the laws of parallelogram (Fig. 5) shows the vertical direction of the spine as trunk flexor and extensor muscles act equally at the hip. If the spine is inclined forward, the extensor muscles of the trunk develop extra tension in comparison with that of the flexors and as a result the pressure on lumber spine develops which can be evaluated by using the Equation No. 6.

In this paper general biomechanical dimensions namely Centre of Gravity, Laws of Parallelogram, Moment of Inertia, Moment of Force, Muscles involved, and the position and function of bones have been analysed scientifically. After analysing the posture biomechanically, it may be expected that the Physical Education Teachers, Yoga Instructors, Yoga Therapists and Sports Coaches will get some feed back during teaching. Simultaneously, the practitioners of yoga may also develop the awareness of those biomechanical principles while performing yogic practices. The research workers of allied Yoga Sciences may get inspiration to undertake research projects in this new analytical approach of biomechanics in Yoga. This may bring an uniformity in postures, mastery over the styles, teaching and evaluation of Asanas wherever they are taught and practised. The emergent standardized techniques, it is believed, may improve the maintenance and experiential aspects of Asanas. Further studies on other joints and corresponding muscles involved are in progress.

Acknowledgements

Authors are grateful to Sri O. P. Tiwari, M. L. Gharote, S. K. Ganguly and R. S. Bhogal of Kaivalyadhama S. M. Y. M. Samiti, Lonavla (Pune) for their interest in this work.

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Yoga Mimamsa Vol. XXVIII, No. 3, pp. 33 to 40 Oct. 1989.

Adhi, Vyadhi and Pranagati -- Some Reflections

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Dr. M. V Bhole **

I.0 Introduction :

I.1 In an earlier communication (Dave & Bhole, 1989), while making an attempt to explain the term 'Vyādhi' as an antonym of Samadhi in relation to Chitta, it was pointed out that most of the commentators on Patanjala Yoga Sutras have interpreted this term as disease, illness, 'roga' or sickness of the physical body and occassionally of the mind (manas) as is usually expounded in translations and commentaries on Ayurveda.

I.2 Apparently, there seems to be a gap in these two types of understandings viz. :

i) Vyādhi as an opposite of Samādhi in relation to Chitta and

ii) Vyādhi as a disease of the physical body and the mind (manas). Therefore, necessity was felt to re-conciliate these differences to the extent possible in order to understand P. Y. S. I : 30 in relation to P. Y. S. I : 29 as was propounded by the authors in the earlier article.

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I.3 Chitta-prasadan has been emphasised by Patanjali to deal with Chitta Vikshepas for which tackling of Prana in a particular way has been recommended in P. Y. S. I : 34 (Prachhardan Vidhāranābhyām Vā Prānasya). Thus it also become imperative to give a thought to the working of prana in relation to the tackling of Vyādhi.

II.0 **Discussions :**

II.1 Yoga, Ayurveda and Tantra are related with the human life and existance. We find their mention in the Vedas and Upanishads. Samkhya Darshan is supposed to be the philosophical basis of these disciplines. However, these disciplines have given importance to different aspects of human existence.

One of the important objectives of Ayurveda is 'removal of the diseases of the patients and preservation of the well-being of the healthy' (Sushrut). According to its philosophy both the pure consciousness as well as the dead body are beyond the scope of treatment. Only a living body is amenable to various treatment procedures. Therefore, most of the thinking is done in terms of 'doshas', 'dhatus', 'malas' and 'mind'.

Yoga and Tantra mostly deal with the subject of realisation of oneself, nature of the ultimate reality and finally liberation of the self. Patanjala Yoga Sutra have given importance to the tackling of the chittavrittis while Tantra seems to have given importance to the tackling of the Prana working inside the body. Therefore, even though the same terms like Vyādhi, Vāyu and Prāna are found in these disciplines, the meaning and understanding conveyed by them may not be the same (See Foot notes 1 and 2).

II. 21 The terms 'Ādhi' and 'Vyādhi' often go together in a pair. According to Ayurvedic line of thinking they give the following meaning and understanding :

Ādhi = Usually mental (manas) pain or anguish, agony, anxiety, distress, (1, 2a, 3a, 11a).

Vyādhi = Usually physical ailment, disease, sickness, 'roga' jwara etc. (2b, 3a, 4a, 7, 11b).

Foot note :- 1. We can take the example of the word 'BAR' in English language. Even though its spelling and pronunciation remains the same, it conveys different meaning and understandings in different contexts.

Examples :

1. In Education – Bar-at-Law
2. In Geography – Iso-Bars (lines indicating same pressure)
3. In Graphics – Bar diagram
4. In Gymnastics – Double Bar, Single Bar (Apparatus as well as exercise)
5. In Judiciary – Bar Association
6. In Medicine (Unani) Bar (Vitiligo)
7. In Office – Efficiency Bar (in Pay Scale)
8. In Physics – Metal Bar (elongated piece of metal)
9. In Social life – Wine Bar.

Foot note 2 :- Yogen chittasya, ...,
Malam Sharirasya cha Vaidyaken.

Important Ayurvedic treatise like Charaka Samhita has clearly mentioned that Vyadhi indicates a disturbed state of 'doshas', 'dhatus' and 'malas' and thus it gets related to the physical body. In the same way the term 'Adhi' is often employed to indicate mental diseases or disorders due to the imbalance in the Rajas and Tamas gunas (4b).

II.2.2 In Yoga, however, the term Vyadhi as found in Patanjala Yoga Sutra I ; 30 shows a clear relationship with chitta as it has been mentioned as a chitta-vikshepa. Therefore, it has been proposed by the authors that the term Vyadhi appearing in the pair Adhi-Vyadhi as employed in Ayurveda should not be used to explain and translate the term vyadhi in P. Y. S. I : 30 without proper explanation.

II.2.3 When purusha is completely identified and involved with the prakriti, then all the imbalances of the prakriti will appear to be the imbalances of the purusha. Usually, such a state prevails in an individual who is a beginner in Yoga. In this situation, Adhi and Vyadhi of the body and mind (i. e. of the prakriti) will appear to be the Adhi and Vyadhi of the purusha. In this sense, the interpretations of the commentators on P. Y. S. could be accepted as correct. However, when the individual realises that Purusha and the Chitta can be either in a state of balance or imbalance then the term Vyadhi should be looked upon as related with the chitta. There need not be any physical and/or mental diseases, but still then, there can be a possibility of Vyadhi at the level of the chitta.

II.3 In Tantric literature as well as in various yoga Upanishads, the concept of Prana finds a significantly high place. The discriptions lead us to the understanding that Purusha operates in the body through Prana. On the basis of these descriptions, we can make a statement that Prana, as energy, belongs to the Purusha.

Ayurveda has given lot of importance to 'Vāt' or 'Vāyu' and it has been clearly mentioned that the Pitta and Kapha doshas, dhatus and malas are inactive without Vayu (10) (See Foot-note 3), However, this Vayu or Vat is one of the five mahabhutas.

Hathapradipika (6) has mentioned about the close relationship between 'vāt' and 'chitta' i. e., functioning or quietening of one is responsible for the functioning or quietening of the other and vice-versa (Chapt. II. Verse 2). However, it is silent about the working of dosha-dhatu-mala and has recommended medical treatment if any imbalances exist at the level of the body (H. P. V : 22).

Thus there is enough ground to suppose and propose that the concept of 'Prana', 'Vāt' and 'Vāyu' in Ayurveda, Yoga Upanishads, and Hathapradipika may not be equatable or comparable with each other.

Foot note 3 :- Pitta Pangu, Kapha Pangu, Pangavo Maladhātavah, Vāyuna yava niyantī tava gachhanti meghavat.

(Sharangdhar.)

(Inert is pittam, inert is kapha, inert are the the malas and dhatus. Like clouds they are carried by the Vayu.)

II.4 In Vedic literature we get two terms in relation to Pranic activity. They are 'Saddhrichi Pranagati and Vishuchi Pranagati' i. e. right and wrong mode of the working of the prana (8, 9). Thus right functioning of prana will give rise to balance, equillibrium and homeostasis while wrong functioning of prana will disturb the same.

Thus disturbed state of the chitta will reflect in the disturbed functioning of prana and this in turn will give rise to disturbances of the body and the mind.

III.0 Conclusion :

III.1 In general, it can be said that Ayurveda deals with the imbalances of the body and mind (Sharir-malas), Yoga with the chitta vrittis and Tantra with Pranagatis. Therefore, the same terms appearing in these disciplines, can have different meanings and understandings. In Ayurveda, the term Vyadhi usually denotes physical disease and the term Adhi denotes mental disease, while in Yoga, Vyadhi indicates Chitta-vikshepa.

The term Vyadhi appearing in P. Y. S. I : 30 is related with the P. Y. S. I : 29 which deals with the subject of 'pratyak-chetanādhigama' at the level of chitta and it can lead the chitta to the level of the Īshwar.

Therefore, interpreting the term Vyadhi appearing in P. Y. S. I : 30 in the language of Ayurveda seems to be slightly misleading, if not completely incorrect.

III.2.3 On the assumption of the relationship between Yoga and Veda, we can suppose that prana is the energy aspect of Purusha, and it can work in two ways viz, in right way (Saddhrichi gati) or wrong way (Vishuchi gati). Thus prana gatis will exhibit the status of the Purusha and will also decide the nature of various body functions going on in a balanced or imbalanced way.

III.3 In the case of a beginner in Yoga, the purusha is completely identified and involved with Prakriti. Therefore disturbances and imbalances of Prakriti will appear to be that of the Purusha. In this sense, interpreting Vyadhi as sickness while interpreting P. Y. S. I : 30 seems correct.

However, as one will progress in Yoga, the separateness of Purusha with Prakriti will be realised and then the term Vyadhi will have to be understood as the opposite of Samadhi in relation to Chitta. The same thing will operate in respect of Vat or Vayu on one hand and Prana on the other.

Acknowledgement :

The authors are grateful to Swami Digambarji for his valuable guidance, to Shri O. P. Tiwari for appreciating the new kind of approach and to all the research staff members for their constructive comments and suggestions.

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Understanding the technique and effect of Kapalabhati as found in books in Indian Languages other than Sanskrit*

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Abstract :

52 books in various Indian Languages (Bengali-1 Gujarathi 2, Hindi 24, Malyalam 7, Marathi 16, Tamil 2) other than Sanskrit were studied to get more details about the technique of KB which were not available in Sanskrit texts.

Eventhough some of the books have quoted Hathapradipika and Gheranda Samhita, they have added many more details in respect of meaning, position, technique, precautions & contraindications and effects of K.B. The nature of breathing advocated by Sanskrit texts is active rechaka-puraka in quick succession like a black smith's bellow. Apart from this technique some of these author have advocated second technique, i. e. active rechaka &

Work carried out with the Grant-in-aid from the Ministries of Education, Govt. of India and Maharashtra State.

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passive puraka. However such technical details give much importance to the practitioner rather than to the technique. All these texts have failed to explain how KB acts as an accessary (karana) to pranayama & proper 'dose' to achieve desired effects.

1.0 Introduction :

Sanskrit literature lacks details of the technique of Kapalabhati (KB) becomes obvious from the review article of Desai and Bhole (1988). Observing the technique of Kapalabhati as followed in classroom gives rise to a number of questions as indicated below ;

1. What does the term Kapalabhati (KB) exactly mean ?
2. How does Kapalabhati act as a cleansing process and as an accessory (Karana) for Pranayama ?
3. Is there any particular body position essential for the practice of Kapalabhati ?
4. What are the essential and important features of the technique of Kapalabhati ?
5. What information is available about the practice of Kapalabhati ?
6. Is Kapalabhati viewed as something more than a cleansing process ?
7. What are the useful hints and precautions to be taken for the practice of Kapalabhati ?

8. When one should stop or reduce the practice of Kapalabhati ?

9. Under which conditions one should take medical advice and proper guidance for starting, stopping and continuing the practice of Kapalabhati ?

10. Under which conditions and for whom practice of Kapalabhati is contra-indicated ?

11. What is the expected out-come or effects of the practice of Kapalabhati technique and when one can expect to get them ?

1.2 Therefore, it was decided to study books in Indian languages other than Sanskrit to find answers to these questions. The results of this study is presented here.

2.0 Materials and Methods :

Easily available books in regional Indian languages dealing with hathayogic techniques were studied and scrutinized to seek answers in the above listed questions. Past students of the Institution were approached to send the details of the books and the technique of Kapalabhati available with them in different Indian languages for compilation and analytical study.

3.0 Observations and Comments :

3.1 Like Sanskrit, authoritative text books were not available in regional languages of India. Therefore, study had to be based on books of popular nature mostly used by the students and teachers as their guide books.

3,2 Out of 84 books referred for this purpose, 52 were found to deal with the topic of Kapalabhati. Language wise classification of these books is as follows :-

Bengali (B) = 1 : Gujarathi (G) = 2
Hindi (H) = 24 : Malyalam (Mal.) = 7
Marathi(M) = 16 : Tamil (T) = 2

3.3 Answers to various questions as found in these books along with the comments by the authors, if any, are given below :

3.3.1 **Question one :-**

What does the term. 'Kapalabhati' exactly mean ?
Findings :-

A. The term Kapalabhati is a combination of two words, i, e., Kapal+Bhati 1. The understanding of the term 'Kapal' is given as follows :

a) Skull :- M9, H4, H16, H22b;
b) Forehead : M8, H1, H10, H12;
c) Head :- M3, H2.

2. All these authors have explained the term 'Bhati' as under :

a) Shining,
b) Glowing or
c) Brightness.

All the other authors are silent on this issue.

B. The term 'Kapalabhati' means, Frontal brain bellowing (Mal. 4)

Comments :

1. Sanskrit texts do not give meaning of the term Kapalabhati, while this meaning becomes available to us from these books.
2. The term 'Frontal brain bellowing' fails to give any clear cut idea or understanding.

3.3.2 Question two :

How does Kapalabhati acts as a cleansing process and as an Accessory (Karana) for Pranayama ?

Findings :-

A. Based on Ayurvedic concepts :

a) Kapalabhati removes :-

1. 'Doshas' (disorders) from the head (M3, H22b);
2. 'Kapha' from 'Kapal' and lungs (Mal. 2);
3. 'Kaphadosha' from the region above the neck (Mal. 7).

Comments :

One will be required to refer to Ayurvedic text for developing better understanding of these statements.

B. Based on the concepts of modern medicine :

Cleanses nasal cavities, air sinuses and respiratory pathways. (M3, M8, M12, Mal. 1)

C. **Based on yogic Concepts :**

Purifies and cleanses parts inside the head and leads them to brightness and glowing (M8, M12, Mal. 1).

Comments :

1. One cannot understand the exact implication of the terms 'purification' and 'cleansing' by reading these books. One will have to approach a living master or Ayurvedic texts where proper understanding of the concept of 'shodhan' i. e., purification could be developed.
2. One may be able to understand cleansing of the nose and respiratory pathways as used in daily life. However, purification of the parts inside the head or skull cannot be easily explained.
3. How Kapalbhati acts as a 'karana' i. e. an accessory for pranayama does not become clear from these statements.

3.3.3 Question Three :

"Is there any particular body position essential for the practice of Kapalabhati" ?

Findings :

A. Body positions (asanas) mentioned by different authors –

1. Padmasana – M3, M4, M5, M6, M8, M10, M11, M12, M13,

M16b, H1, H3, H5, -H10, H11, H12, H13, H15, H16, H18, H20, H22, B1, G2, T2, Mal. 2, Mal, 7.

2. Sukhasana -- M6, M11, M12, M16b, H10, H15, H16, H21, Mal. 7.

3. Siddhasana -- M4, M5b, M6, H1, H5, H6, H12, H13, H16.

4. Swastikasana -- M4, M13, H4, H5, H20.

5. Any Meditative Asana -- M3, M12, M13, H12, Mal.4.

6. Any desirable Asana -- H6, H9, Mal. 2.

7. Vajrasana -- M8, M13.

8. Virasana -- H16

9. Samasana -- M3

10. Ardha-Padmasana -- G1

11. Standing position with hands over the waist-- M8.

B. Arguments in favour of particular position of the body to be used for the practice of Kapalbhati.

1. M12 has advocates Padmasana on the plea that only this asana is capable of withstanding the vibrations produced during the practice of Kapalabhati.

2. M13 has stated that free movements of the abdominal wall are possible in sitting position in comparison to lying down or standing position of the body.

3. M8 recommends standing position, if one is unable to assume any of the sitting positions.

C. Details about the placement of hands and back :-

1. Firm and steady position of the body with straight back and hands kept over the knees. (M3, M4, M5, M6, M10, M16, H5, H10, H11, H12, H15, H20).
2. Erect back and hands firmly pressed over the knees (M8, H16, G1, T2, Mal. 4, Mal. 7).
3. Keeping a balanced condition of the body, neck and head (i. e., समं काय शिरो ग्रीवं) (M3, M12. H20).

Comments :-

1. Sanskrit texts do not give such definite instructions in respect of any particular asana or body position for the practice of Kapalabhati.
2. There is no unanimity about any particular position of the body to be used for the practice of Kapalabhati.
3. From the above findings, it becomes obvious that no particular asana is essential for the practice of Kapalabhati. However, any suitable and comfortable sitting position is advisable.

3.3.4 Question Four

What are the essential and important features of the technique of Kapalabhati ?

Findings :-

Technical details available from these books can be considered under the following heads :-

A) Nature of breathing
B) Abdominal Movement
C) Movement of the Chest
D) Use of Nostrils
E) Production of sound or otherwise.

Details of informations collected under each heading has been summarised below :

A. **Nature of Breathing :**

1. **Using the Yogic Term :**

a) Quick puraka and rechaka like black-smith's bellow, giving importance to lower abdomen. (H1, H3, H6, H7, H8, H9, H10, H17, H18, H21, H22, B1, G1, G2, Mal.2, Mal.5, Mal.6).

b) Forceful active rechaka and passive puraka with abdominal muscles (M3, M5b, M10, M12, M13, M14, M15, M16, H12, H13, H15, H16, H23, Mal.4)

2. **Using common terms**

a) Active exhalation in a jerky fashion with abdominal muscles alongwith the contraction of the anal area. (M12).

b) Deep inhalation and quick exhalation (H2)

c) Deep inhalation and deep exhalation (H5)

d) Exhalation should be half of inhalation (e. g. inhalation for 2 secs. and exhalation for 1 sec.) (Mal. 1, Mal. 7).

Comments :

1. The authors of statement (Ia) seem to represent the same idea as given in Sanskrit book. In addition, movement of the lower abdomen is mentioned.
2. All the other statements seem to have some deviations from the Sanskrit texts in one respect or the other.
3. Deep inhalation and deep exhalation mentioned in 2.b & c may not allow the practitioner to get an experience of the type of breathing as is mentioned in Sanskrit texts.
4. It seems that the terms inhalation and exhalation are used to represent puraka and rechaka respectively. Such an understanding may not prove to be correct.

B. Abdominal Movement

1. Use of abdominal muscles during puraka, rechaka (M3, 6, 5, 10, 13, 14, 15, 16; H12, 13, 15, 16, 23; Mal. 4.)
2. Use of lower abdomen during rechaka (exhalation) (H1, 3, 6, 7, 8, 9, 10, 17, 18, 20, 21, 22; B1, G1, 2: Mal. 2, 5, 6; M12)
3. During exhalation, throw the naval region against the backbone in an inwards and upwards direction by sudden contraction of the abdomen like a rubber wall rebounding from the floor. The navel region should, come back to the initial condition by relaxing the abdomen. During this time, inhalation will take place (T2).

Comments :-

The typical movement that takes place due to sudden contraction followed by equally efficient relaxation of the abdominal muscles as mentioned in 3 above is popularly understood as 'Kapalbhati Stroke'. Reference to this term is not found in Sanskrit literature.

C. Movement of the Chest :-

Only 13 authors have referred to the condition of the chest during the performance of Kapalbhati. Four different conditions have been mentioned as follows :

1. Chest should be kept steady (M3, 8, 10, 13; T2)
2. It should be fixed in an end inspiratory condition (M4, 11, 16b; H5, 12, 15).
3. It should be kept in normal condition without having any movement (T2)
4. It should be kept in contracted condition throughout the practice (M8).

Comments :-

1. Sanskrit texts do not mention about the position of the chest.
2. No unanimity is seen in respect of the position of the chest amongst the 13 authors who have made its reference.

D. Use of Nostrils :

1. Use both the nostrils (M2, 3, 4, 6, 7, 10; H2, 4, 5, 6, 7, 18; B1, G1, Mal. 1, 2, 5, 6)

2. Start with any one nostril and after sufficient practice switch over to both the nostrils (H10, Mal. 1).

3. Use one nostril for inhalation-exhalation and then change the nostril to repeat the same action.

   (N. B. : This is not like in Loma-Viloma) (M5a; H1, 10, 11, 16; Mal. 1, 2b).

4. After inhaling like blacksmith's bellow, through one nostril, forcefully and quickly exhale through the other like in Loma-Viloma (M1, H1, 3, 6b, 8, 9, 14, 19, 20, 21; Mal. 7).

   Use thumb for closing the nostril (M1, H3, H21)

   Use index finger for closing the nostril (Mal. 1)

5. Close right nostril. Inhale and exhale through the left nostril speedily. Then inhale slowly through the left and exhale through right. Repeat the same act with the right nostril. Use both the nostrils to perform Kapalabhati after this (Mal. 2b).

Comments :

1. 39 authors have written about the use of the nostrils during the practice of Kapalabhati.

2. All sorts of permutations and combinations are found.

E. Production of sound or otherwise

Wide variations were found in respect of the production of sound. They are summarised below :

1. To produce :
   - a) sound like a blacksmith's below during rechaka; (M6)
   - b) frictional sound during rechaka (M8, H10).
   - c) Nasalised soo-soo sound during rechaka (H10)
   - d) Nasalised foo-foo sound during rechaka (H20)
   - e) smooth sound (Mal. 7).
2. Not to produce any sound (Mal. 1)
3. To feel the striking of air inside the nostrils and air-passage (Mal. 7).

Comments :-

1. Only 6 authors have suggested production of sound while one author has recommended noiseless performance of Kapalabhati. All others do not refer to this point.
2. As Kapalabhati technique involves action like the blacksmith's bellow, some kind of sound is expected to be produced during the process of rechaka. Even a frictional sound may be produced due to the air rushing out of the air passages.
3. No author has indicated the area from where the sound is expected to be produced e. g. glottis, nostrils or any other area.

3.3.5 Question five :-

What information is available about the practice of Kapalabhati ?

Findings :

1. Practice Kapalbhati strokes as per one's capacity (M1, 11, 15 ; H8)

2. To work with :

   a. 15–20 strokes (M16b, H2, H11, H14)

   b. 25 strokes (H3)

   c. 4 to 5 strokes in the beginning. Increase them upto 15 to 20 strokes after 5 to 6 months and then upto 100 to 125 strokes after prolonged practice (M7, M16b)
   Number of strokes should be increased gradually.

   d. 50 to 60 strokes in one round (T1, Mal.4, Mal.7).

   e. Begin with 20 strokes in one round followed by Shavasana for 30 secs (observe free flow of breathing) (T2).

3. a) Start with 10 strokes in one round in the morning and continue as follows :

   First 8 days – 2 rounds
   8 – 15 days – 4 rounds
   15 – 22 days – 5 rounds
   22 – 30 days – 6 rounds
   30 days onwards– 6 to 22 rounds (M4; H5)

   b) Start with 11 to 20 strokes followed by 4 to 5 deep breaths in one round and such 3 rounds. Gradually increase the strokes upto 108 in one round (M10).

c) Start with 20 strokes per min. Increase upto 50 to 60 strokes per minute and then to 120 strokes per minute (H1, 5, 13; B1).

d) Begin with Kapalakhati strokes as per capacity followed by natural breathing for some time in one round. Gradually increase the number of strokes to 21 in one round. Practice such 3 rounds at a time.

Afterwards either go on increasing the number of strokes in one round keeping the number of rounds constant, or go on increasing the number of rounds keeping the number of strokes constant.

Finally try to have 120 strokes in on minute in one round and such 3 round (M13).

e) Perform 20 strokes, when practised as a cleansing process; (M51), and one stroke per second when practised as a Pranayama (M 5b).

4. New Learner should begin with 30 strokes at the rate of 60 strokes/min. to be followed by rest for one min. Such three rounds. Gradually increase the speed to 120 strokes/min, as well as the time to one min. in one round.

For spiritual purpose, one round should be of three mins. duration (H12).

5. Ordinary practitioner should practice at the rate of one rechaka per sec. for one min; healthy practitioners should practice at the rate of 2 rechakas per second for one min., and old practitioners should practice maximum of 200 rechakas in one min. Such three rounds should be practised at a time (H 23).
6. Practice 21 strokes in one Pranayama and such 5 pranayamas in the beginning. Add one pranayama per week and increase upto 21 pranayamas (H 7).

Comments :-

1. Sanskrit texts mention about the particular nature of rechaka-puraka as the technique of Kapalabhati and they do not refer to the number of the strokes, rate or speed at which the strokes are to be delivered, duration of delivering the strokes and number of rounds or cycles.

   The books under present study have given various details in respect of these parameters. However, no unanimity is observed amongst different authors.

2. Some authors have referred to the number of the strokes only (e. g. 1 & 2 and 6 above). Some have mentioned about the number of strokes and rounds, but are silent about the speed (e. g. 3a, b, c, d, e). All the four aspects of the practice have been described by H12 and H23 as mentioned 4 & 5.

3. M5 referred in 3e has differentiated between the practice of Kapalabhati as a cleansing process and as a pranayama.
4. H12 has given dfferent time units for spiritual and non-spiritual practitioners of Kapalabhati.

3.3.6 Question six :-

"Is Kapalabhati viewed as something more than a cleansing process ?"

Findings :-

During this review, it was observed that 21 authors have tried to present Kapalabhati as a pranayama or similar to pranayama, even though the classical Sanskrit texts describe it as a cleansing process. Their statements and nature of instructions to that effect are summarised below :-

A. Kapalabhati as Pranayama or similar to Pranayama in effect.

1. The term 'Kapalabhati pranayama has been used by M 4, 5b, 14, 16b ; H2, 4, 6a, 13, 16, 22 ; and Mal. 4.
2. 'Kapalabhati is a milder form of Bhastrika has been mentioned in M 9, 15 and Mal. 2.
3. 'Kapalabhati pranayama is similar to Bhastrika Pranayama (M1, H3, 7, 20).
4. 'Kapalabhati is pranayama without Kumbhaka' (M5b), M14, M16b, H6b, H21, M22, G2).
5. Most of the authors have contributed to the view that Kapalabhati as a cleansing

process, also has an action similar to pranayama without kumbhaka.

B. Nature of Instruction for Practicing Kapalabkati as a Pranayama.

1. 'Kapalabhati as a pranayama without Kumbhaka'. After one round of Kapalabhati take a long breath in and exhale for double the time (M 5b, 14, 16b,; H6b. 21, 22; G2; Mal. 4).

2. 'Kapalabhati as a pranayama with antar kumbhaka' :

   a) Have a momentory (निमिषमात्र) Kumbhaka after each rechaka (M9, 15).

   b) Perform kumbhaka after 10 expulsions by closing the nostrils (M4; H15; H18).

   c) Perform kumbhaka as long as possible after inhalation.

   d) Perform kumbhaka along with Jalandhara bandha after closing the nostrils (H 7).

   e) Have breath holding (kumbhaka) for 1/2 the time than your actual breath holding capacity (H2).

   f) Perform kumbhaka after 10 expulsions by closing the nostrils along with three bandhas following 4 : 16 : 8 ratio for puraka–kumbhaka–rechaka.

3. 'Kapalabhati as a pranayama with bahya kumbhaka'. Apply three bandhas after finishing Kapalabhati strokes (M10 & H13).

4. 'Kapalabhati as a Pranayama with antar and bahya kumbhaka'. First, practice Bahyakumbhaka as per one's capacity after practising 50 expulsion. They practice antarkumbhaka (for 5–10 secs. comfortably) after puraka and then proceed to another round of 50 expulsion (H10).

Comments :

Describing Kapalabhati as pranayama or similar to pranayama is a new dimension of understanding Kapalabhati. This view point is not available in Sanskrit texts.

3.3.7 Question Seven :

What are the useful hints and precautions for the practice of Kapalabhati :

Findings :

A. **As a preparation for Kapalabhati :**

1) Jalaneti and Sutraneti (M8, 10, 16b,; H3, 24).

2) Three Uddiyanas after Jalaneti (M10, H24).

3) Continuous practice of asana and breathing exercises for 2 months (Mal. 7).

B. **For actual practice of Kapalabhati**

1) Rate of breathing should not be increased in the beginning before establishing proper association between the activity of the abdominal muscles and respiration i. e. the 'stroke' (M10, 11; H15).

2) Strokes of Kapalabhati should be delivered below the umbilicus (hypogastric region) (M10, H12).

3) Rate and rhythm of the strokes should be increased gradually as per the capacity of the practitioner (M4, 7, 12; H5, H6a, 10, 19; B1; T1).

4) Duration of Kapalabhati should be fixed according to one's age, capacity and season (M4; H5).

5) Eyes should be kept closed throughout the practice (M4, 8; H1).

6) Rechaka should not become shallow (M12) and it should not be injurious to any part inside the body (H5).

7) Contraction of the muscles of the nose, eyebrows, throat and vocal cords should be avoided (M8, H12)

8) Body should be bent forwards during exhalation and backward during inhalation. The trunk, neck, head should be kept steady (M8).

9) Kapalabhati should be practised :
   a) on empty stomach (M10, M12, Mal.7)
   b) after taking bath (H5) and after breathing becomes quiet (H13).

10) Anal muscles should be contracted with proper understanding and awareness (M8)

11) Nostrils and air passages should be kept open during the practice (M13, T2).

12) Uniform gap should be kept between two breaths (FI).

13) Practice Kapalabhati regularly if one has excess fat (H20).

14) Eat rice with green grams (Khichadi) or rice with milk to have the desired effect (H22a).

15) Practice Kapalabhati before starting pranayama as a sadhana.

3.3.8 Question Eight

"When one should stop or reduce the practice of Kapalabhati ?"

Findings :

1. One should stop or reduce the practice of Kapalabhati if one experiences :

- dryness in mouth and nose (M7)
- irritation in bronchial tree, throat and nose (M8, M12)
- bleeding from the nose (M15, 16)
- cold and blocking sensation in nose (M8)
- hammering sensation inside the head (M35)
- giddiness and heaviness in head (M8, 12)
- irregularity in breathing movements i. e. non-rhythmic and change in sound (M7, S)
- If Vata, Pitta and Kapha are in balanced condition in the body (GI.)

2. Stop the practice completely if the same experiences recurr after resuming the practice and if the irritation and pain perists (M15).

Comments :

Sanskrit texts have not given such hints. Above listed hints are beneficial for the practitioners to avoid damage to their systems.

3.3.9. Question Nine :

"Under which conditions one should take medical advice and proper guidance for starting, stopping and continuing the practice of Kapalabhati" ?

Finding :

One should take medical advice and proper guidance for starting and continuing the practice of Kapalabhati, if one has :

a) weak body (M3)

b) weak diaphragm and lower abdominal muscles (M12)

c) deviated septum or polyp in the nose (M8)

d) severe anaemia (M10, Mal. 1, 7).

e) insomnia (M16, Mal. 1, 7)

f) diseases of lungs and heart (M12, 13)

g) asthma and other respiratory disorders (H23)

Comments :

1) Sanskrit texts do not give such instructions.

2) Even though one may have above listed conditions, one could still practice Kapalabhati under proper guidance.

3.3.10 Question Ten :

"Under which conditions and for whom practice of Kapalabhati is contraindicated ? "

Findings :

If one has :

a) weak body and weak lungs (M15; H10, 20).

b) high temperature (H22a)

c) severe chest pain (Mal. 1, Mal. 7)

d) disturbed state of mind (H 22a)

e) high and low blood pressure (M15, H16)

f) exhaling with undue force (H12)

g) No necessity for Kapalabhati (H 22a)

h) diseases of : ear and eyes (M15, H16, Mal. 1, Mal. 7); lungs (M12, M15, 16, H22, Mal. 7); pleurisy (Mal.7); hyperacidity and pittavikara (H 18, H 22a); insufficiency or weakness of heart (M12, 15, 16a, H18, 22, Mal. 7); and jaundice (M 16 16a, H18).

2. **Under following conditions** :

a) travelling (H 18, H 22a)

b) rains (H18, H 22a)

d) cold waves (H 18, H 22a)

3. For ladies (M15)

Comments :

Sanskrit texts do not mention about any contraindications for Kapalabhati. However, above referred statements assume importance for the consideration of Kapalabhati.

3.3.11 Question Eleven :

"What is the expected out-come or effects of the practice of Kapalabhati technique and when one can expect to get them ? "

Findings :

Effects of Kapalabhati can be considered under the following heads :

A) Yogic importance
B) Physiological importance
C) Psychological importance
D) Therapeutic importance
E) General importance

A. **Yogic Importance** :

1. Brings shinning and brightness on and to the forehead (M8, 16b).
2. Cleanses and purifies the nadis (M1, 4, 12, 16b H4, 5).
3. Stimulates nadis and Chakras and helps in meditation (mal. 2)
4. Helps to get control over pranic activity (M10).
5. Helps to get control over indriyas (M16a).
6. Helps to dry the nose after Jalaneti (M1, 9, H3, 10, T1).
7. Helps prana to enter and flows inside the Sushumna (H18, 22a, G1, Mal. 2).
8. Prepares for antara kumbhaka and bahya kumbhaka (H10) and increases duration of antara kumbhaka (M 7).
9. helps to have rhythmic and deep puraka–rechaka in pranayama (M 10, H10)
10. Awakens kundalini (M10, 13, H6, 7, 9, Mal. 2).

B. Of Physiological Importance :

1. Brings coolness in eyes (M9).
2. Knowledge about good and bad smells (M4, H5).
3. Increases breathing capacity (M11, 13).
4. Calms down the respiratory centre in the brain (M3, 6, 13).
5. Stimulates brain and improves its efficiency (M 13, 15).
6. Cleanses frontal brain (Mal. 4).
7. Strengthens the diaphragm and the heart (M8, 10, 11, 13, B1).
8. eliminates more CO_2 and absorbs more O_2 in the blood (M12, 13, G2, T1, Mal. 2).
9. Increases gastric fire (H7); improves digestive capacity (H3, H6, H10, G2).
10. Strengthens and tones up the pancreas, spleen, liver, abdominal muscles due to massage like action (M3, 6, 8, 9, 12, Mal. 2, 7).
11. Purifies and activates the lungs which in turn helps to keep away from infections like tuberculosis away (H1, 6, G2, Mal. 7)
12. Enables to get sound and deep sleep and helps to achieve full benefits of rest (M8).

C) Of Psychological Importance :

1. Helps to remove :
   a. worries (Mal. 4).
   b. loss of memory (Mal. 7).
   c. restlessness (M4, H5).

2. helps people who have more mental work (M12).
3. enables a person to feel light, flexible and enthusiastic (M7, T2),
4. gives calmness to head (M4, H5).
5. stabilizes and calms down the mind (M4, 7, 16a, H5, 10, Mal. 4)
6. helps in achieving confidence (M8).

D) **Of Therapeutic Importance :**

i) Removes :

a. headache, heaviness in head and giddiness (H2, Mal. 7).

b. cough, cold, rhinitis, sinusitis, pharyngitis (M8, 11, 12, 16, H2, 10, 12, 14, 15, H18, 22a, B1).

c. diseases of throat (Mal. 1)

d. controls asthma, bronchial spasm and other disorders (M8, 12, 14, H1, 10, 18, 21, G2, T1).

e. indigestion, loss of appetite, gases, acidity, constipation, worms (M8, 16, b, H17, 18, H20, 22a, 231, B1).

f. disorders of phlegm and imbalances of three doshas, (M1, 4, 5a, H1, 3, 5, 6, 7, 8, 9, 11, 17, 18, 21, 22a, 23, B1, G1, 2, T1, Mal. 4, 5, 6).

g. excess fat (M6, 8, H6b, 20).

h. blood diseases; low blood pressure (H2, 22, 23).

i. enables to stop hysterical fits (H2).

E) Of General Iuportance :

1. helps in increasing enthusiasm and reduces lethargy (H10)
2. Help singers, lawyers, teachers and orators to speak long and continuous sentences (M5b, 8, 13).
3. Helps swimmers, runners and players to develop skills and natural activity (M 5b, 8).

Comments :

1. Sanskrit texts, Hatha Pradipika, Gheranda Samhita and Yoga Chintamani mainly refer to two effects of Kapalabhati, i. e. 'Kapalabhati and Removal of phlegm and diseases related to it. Removal of all diseases have been mentioned in Hatha Ratnavali. The authors of various books under study have added number of effects which are directly or indirectly related to the practice of Kapalabhati. However, they are silent about the 'dose' that will be required for achieving the desired effects.

4.0 Discussions and Conclusions :

1. Ten authors have quoted Hathapradipika (M2, 3, 6, 12, M13, ; H3, 6a, 23, Mal. 6, 7); and seven authors of various books under study have added number of effects which are directly or indirectly related to the practice of Kapalabhati. However, they are silent about the 'does' that will be required for achieving the desired effects.

4.0 Discussions and Conclusions :

1. Ten authors have quoted Hathapradipika (M2, 3, 6, 12, M13, ; H3, 6a, 23, Mal. 6, 7); and seven author have quoted Gheranda Samhita (M10, 12, 13, H6a, 23, 24) as their source books. While quoting these Sanskrit texts, the authors have added many things of their own in respect of meaning, position, technical details, hints, precautions, contra-indications and effect of Kapalabhati. Vishwas Mandlik (M13) has quoted and compared both the texts and has opined that the technique of Hathapradipika is more clear, adequate and suitable for practice than the one given in Gheranda Samhita.

2. When the Sanskrit term Kapalabhati indicates 'Shining of Kapal' (i. e. head, forehcad, skull, brain etc.), these authors have emphasised the cleansing of the bronchial tree (respiratory passages) along with the 'Kapal' while describing the meaning and understanding of the term 'Kapalabhati'.

3. Sanskrit texts have described Kapalabhati as an accessory of pranayama, while some of the books under study have described it as a pranayama.

4. Sanskrit texts have mentioned both rechaka and puraka as active phases in Kapalabhati. In the present study two views seems to emerge. One view agrees with the sanskrit texts, while the other view, active rechaka and passive puraka. No explanation is available for this deviation.

3. Through this presentation the most common points about Kapalabhati technique appear to be :–

i) **Body position** ;– Any comfortable sitting position with straight spine and hands put over the knees;

ii) **Essential techniqne of Kapalabhati** :- Rapid breathing movements employed with the help of the abdominal muscles.

iii) **Effect of this particular technique** :- Cleansing of the respiratory pathway (bronchial tree) and air sinuses in the skull.

6. Much light has been thrown on the technical details of Kapalabhati through the above listed questions and answers. However, one does not know about the proper 'does' and duration of Kapalabhati required for achieving the desired results i. e. shining of the skull or forehead as communicated by the term Kapal + Bhati. It still remains obscured and un-explained. So it is desired to extend the present work to the study of literature in other languages.

Acknowledgements :

The authors are thankful to Swami Digambarji, Director of Research, Dr. M. L· Gharote, Dr. M. V. Rajapurkar and all the other staff members for their suggestions and comments for preparing this article.

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